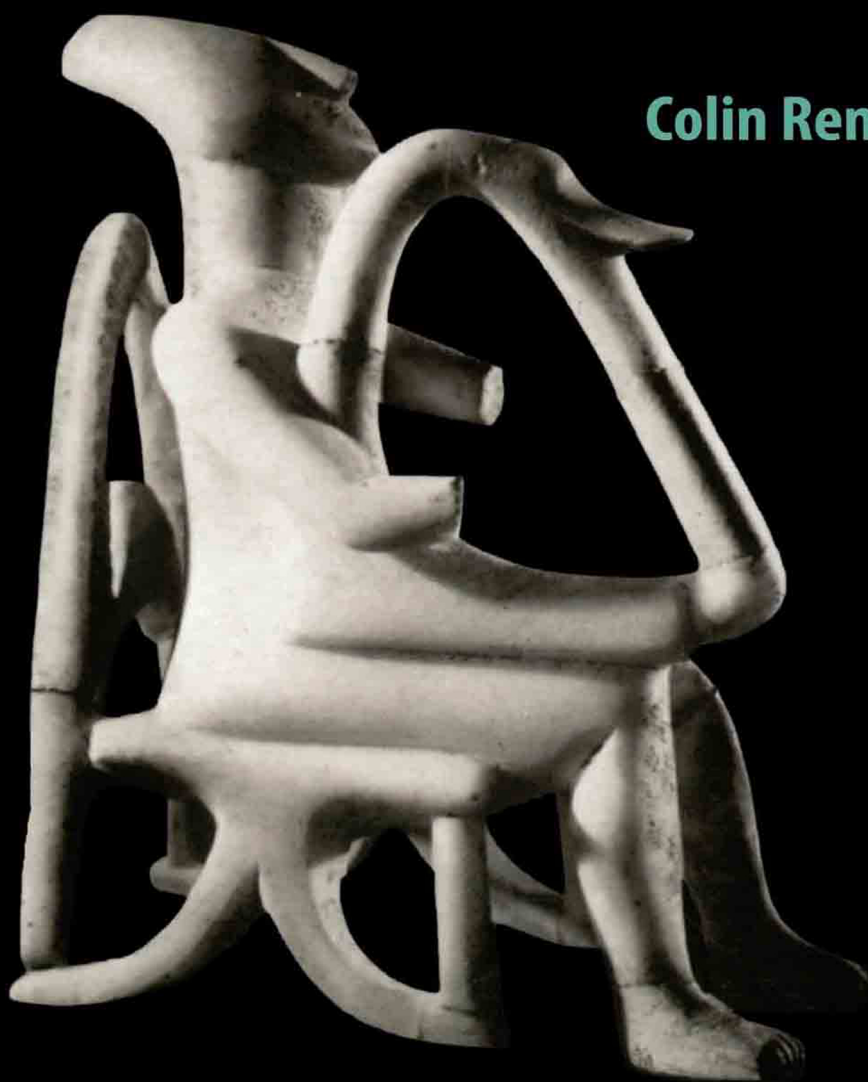


The Emergence of Civilisation

**The Cyclades and the Aegean
in the Third Millennium BC**

Colin Renfrew



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The Emergence of Civilisation



SEATED MARBLE FIGURINE OF THE KEROS-SYROS CULTURE

The Emergence of Civilisation



The Cyclades and the Aegean in the Third Millennium BC

COLIN RENFREW

This edition published in the United Kingdom in 2011. Reprinted in 2017 by
OXBOW BOOKS

The Old Music Hall, 106–108 Cowley Road, Oxford OX4 1JE

and in the United States by

OXBOW BOOKS

1950 Lawrence Road, Havertown, PA 19083

The title *The Emergence of Civilisation* was originally published in 1972 by Methuen

© Colin Renfrew 1972, 2011

Paperback Edition: ISBN 978-0-97740-946-4

Digital Edition: ISBN 978-1-78570-773-5 (epub)

A CIP record for this book is available from the British Library

Cataloging data available from the Library of Congress

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Text type 11 pt Minion Pro

Display type 18/12 pt Myriad Pro

To the Memory of V. Gordon Childe

Wonders are many on earth and the greatest of these
Is man, who rides the ocean and takes his way
Through the deeps, through the wind-swept valleys of perilous seas
That surge and sway.

He is master of ageless Earth, to his own will bending
The immortal mother of gods by the sweat of his brow,
As year succeeds to year with toil unending
Of mule and plough.

He is lord of all things living: birds of the air,
Beasts of the field, all creatures of sea and land
He taketh, cunning to capture and ensnare
With sleight of hand;

Hunting the savage beast from the upland rocks,
Taming the mountain monarch in his lair,
Teaching the wild horse and the roaming ox
His yoke to bear.

The use of language, the wind-swift motion of brain
He learnt; found out the laws of living together
In cities, building him shelter against the rain
And wintry weather.

There is nothing beyond his power. His subtlety
Meeteth all chance, all danger conquereth.
For every ill he hath found its remedy,
Save only death.

FROM SOPHOCLES' *ANTIGONE*
TRANSLATED BY E. F. WATLING

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Part II Culture Process

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Author	Year	Country	Sample Size	Study Design	Findings
Alm et al.	2000	Sweden	1,000	Longitudinal	Increased risk of depression in children of parents with depression.
Angold et al.	2002	USA	1,500	Longitudinal	Depression in children associated with parental depression and family environment.
Beautrais	2000	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Biederman et al.	2001	USA	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2004	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2005	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2006	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2007	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2008	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2009	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2010	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2011	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2012	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2013	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2014	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2015	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2016	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2017	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2018	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2019	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2020	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2021	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2022	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2023	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2024	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.
Bishop et al.	2025	UK	1,000	Longitudinal	Depression in children associated with parental depression and family environment.

From *Scientific American*, June 1967. By courtesy of W. H. Freeman & Co.

FIG. 4.2 Tomb distribution based on Hood 1960 (revised); vegetation zones based on Turrill 1929.

FIG. 5.2 The burnished bowl in Chios. 1, A. Gala, Upper I, A 3.20–3.36; 2, A. Gala, Upper I, 2.90–3.00; 3 to 14 are from Emborio: the Roman numeral indicates the phase: 3, XA, 1466; 4, IXB, 1419; 5, VIII, B1, 535 and 536; 6, VIII, B1, 3532; 7, B3, 1325; 8, VII, 953; 9, VII, 1, 969; 10, VII, 1, 976; 11, VII, 1, 635A; 12, VI, 1E, 747; 13, VI, 1D, 709; 14, II, 2490.

FIG. 5.3 Aegean later neolithic bowls. 2 and 4 to 15, dark with heavy burnish; 1, unburnished; 3, pattern-burnished on the inside. 1 to 4, Kum Tepe, Trench A1, 3.80 m to bedrock; 5 to 10, Kum Tepe, Trench A1, 2.40 to 3.60 m; 11, Kum Tepe, Trench A1, 0 to 1.40 m; 12 and 13, Lerna II, J.442 and Bl. 13; 14 and 15, Poliochni I (Black).

FIG. 5.4 Regional groups of pattern-burnish pottery. Group I (Attic-Kephala culture): 1, Kephala; 2, Velatouri; 3, Athens Agora; 4, Aegina; 5, Askitarío; 6, Corinth; 7, Prosymna; Group II (Pyrgos ware, Early Minoan): 8, Pyrgos; 9, Knossos; 10, Lebena; 11, Arkalochori; 12, Phaistos; 13, Krasí; 14, Eileithyia; and other sites; Group III (Beşikatepe ware): 15, Beşikatepe; 16, Kum Tepe; 17, Akbaşı; 30, Tigani; Group IV (C. and N. Greece): 18, Elateia; 19, Orchomenos; 20, Arkha Psachna; 21, Tsangli; 22, Messiani Maghoula; 23, Arapi; 24, Oztaki; 25, Servia; 26, Aghios Mamas; 27, Vardina; Group V (Chios): 28, Emborio; 29, Aghio Gala.

FIG. 7.1 Reproduced by courtesy of Professor J. L. Caskey.

FIG. 7.2 Reproduced by courtesy of Kohlhammer Verlag.

FIG. 7.3 Pottery from Poliochni, Manika and Iasos. 1, Poliochni V, Myrina Museum 926; 2, Poliochni V, Myrina Museum 248; 3, Manika, find of 1905; 4, Manika tomb (B5); 5, Iasos grave 12, Izmir Museum; 6, Iasos, Izmir Museum 4645.

FIG. 7.4 Reproduced by courtesy of the Harvard University Press.

FIG. 8.4 Reproduced by courtesy of the Cambridge University Press.

FIG. 10.1 Grotta-Pelos bowls. Nos. 1–3, 14–16, from Grotta Naxia; 4, 10–13 from Phylakopi in Melos; 5, from Aghioi Anargyroi in Naxos; 6, from Kato Akrotiri in Amorgos; 7 and 9, from Aïla in Naxos; 8, from Aghios Pandeilemon in Melos.

FIG. 10.3 Grotta-Pelos vessels. 1, cylindrical pyxis from Pelos in Melos, Athens NM 5696; 2, footed vessel from Pelos, Athens NM 5700; 3, spherical pyxis from Pelos, Athens NM 5699; 4, marble *kandila* from grave 9 at Plastiras in Paros, Paros Museum.

- FIG. 10.4** Iasos and the Grotta-Pelos culture. 1, Izmir Museum 559; 2, Plastiras grave 9; 3, Izmir Museum 364; 4, Panormos district of Naxos, Apeiranthos Museum; 5, Izmir Museum 4645; 6, Pelos cemetery, Melos, Athens NM 5699.
- FIG. 10.6** Kum Tepe Ib bowls. 1, Kum Tepe; 2, Protesilaos; 3, Thermi; 4, Poliochni; 5, Emborio; 6, Pamukcu; 7, Kayışlar; 8, Grotta; 9, Aghioi Anargyroi; 10, Ano Kouphonisi; 11, Aila; 12, Kato Akrotiri; 13, Phylakopi; 14, Aghios Pandlemon; 15, Pelos; 16, Akrotiraki; 17, Athens Acropolis; 18, Eutresis; 19, Lerna.
- FIG. 11.1** Syros forms from Chalandriani, in the Syros Museum. Nos. 4 to 8 of marble; 9, clay, red paint on a white slip; the remainder unpainted pots. 1, Museum number 161; 2, 172; 3, 160; 4, 179; 5, 186; 6, 182; 7, 178; 8, 190; 9, 159; 10, 152.
- FIG. 11.2** From Kastri, in Syros Museum. 1, K62/91; 2, K62/88; 3, K62/89; 4, K62/53; 5, K62/26; 6, K62/44.
- FIG. 11.4** Drawings based on Bossert 1967 and Doumas 1963.
- FIG. 12.1** Forms of the Phylakopi I culture. Nos. 1 to 3, painted vessels from Melos in the British Museum: A 346, A 335 and A 340. No. 4, incised kernos, Naxos Museum 736.
- FIG. 12.2** Forms of the Phylakopi I culture, all incised. Nos. 1 and 5 from Paroikia, Paros Museum; nos. 3 and 4 from Phylakopi, Athens National Museum; no. 2, Apeiranthos Museum.
- FIG. 14.1** Neolithic tell mounds listed: Paradimi, Laphrouda, Dikilitash, Polystylo, Sitagroi, Megalokambos, Dhimitra, Kritsana, Nea Nikomedeia, Servia, Argissa, Arapi, Souphli, Ghediki, Rini, Marmariani, Maghoulitsa, Tsani, Tsangli, Rachmani, Sesklo, Dhimini, Acheilleon, Pyrassos, Maghoulia Aidheniotiki, Zerelia, Lionochladi, Elateia, Chaironeia, Corinth, Hagiorgitika, Knossos, Emborio.
- FIG. 14.4** Settlement hierarchy in Crete. Late Minoan settlement distribution from Graham 1962; modern distribution and cultivated lands from Allbaugh 1953; modern sub-regions and transport axes from D. M. Smith et al. 1966.
- FIG. 15.2** Reproduced by courtesy of Princeton University Press.
- FIG. 16.1** Reproduced by courtesy of Johns Hopkins Press.
- FIG. 16.4 & FIG. 16.6** Reproduced by courtesy of Librairie Orientaliste Paul Geuthner.
- FIG. 17.2** From *Archaiologikon Deltion* by courtesy of Upourgeion Proedrias tis Kuberniseos.
- FIG. 17.3** Reproduced by courtesy of Princeton University Press.
- FIG. 18.2** Major early bronze age sites.
Fortified sites: 1, Lerna; 2, Aegina; 3, Askitario; 4, Raphina; 5, Manika; 6, Chalandriani; 7, Panormos; 8, Emborio; 9, Thermi; 10, Poliochni; 11, Troy.
Cemeteries: 12, Steno; 13, Zygoouries; 14, Corinth; 15, Aghios Kosmas; 16, Athens Agora; 17, Pyrgos; 18, Krasi; 19, Kanli Kastelli; 20, Kalathiana; 21, Platanos; 22, Porti; 23, Aghia Triadha; 24, Lebena; 25, Koumasa; 26, Sphoungaras; 27, Mochlos; 28, Palaikas-tro; 29, Glykoperama; 30, Iasos; 31, Hanaytepe; 32, Yortan; 33, Babaköy; 34, Ovabayındır. For Cycladic cemeteries see figs. Appx. 1, 2 to 5 and the Gazetteer.
 'Sauceboat' distribution in mainland Greece based on French 1968 (simplified); data on olive and cereal yields from Kayser and Thompson 1964. (Turkey not included.)

FIG. 19.7 Findspots of folded-arm figurines. 1, Dokathismata; 2, Kapsala; 3, Apantima; 4, Chalandriani; 5, Aghia Irini; 6, Spedos; 7, Karvounolakkoi; 8, Phyrroghes; 9, Aghioi Anargyroi; 10, Kastraki; 11, Phylakopi; 12, Thera; 13, Dhesspotikon; 14, Dhaskalio; 15, Keros, uncertain location; 16, Schinousa, uncertain location; 17, Kapros; 18, Aphendika; 19, Roön; 20, Loutra (Ano Kouphonisi); 21, Polichni; 22, Lionas; 23, Herakleia, uncertain location; 24, Aigiale; 25, Trymalia; 26, south-east Naxos; 27, Pidima; 28, Knossos; 29, Herakleion; 30, Pyrgos; 31, Teke; 32, Siteia; 33, Aghios Onouphrios; 34, Platanos; 35, Koumasa; 36, Lebena; 37, Platyvola.

FIG. 20.4 Forms documenting the international spirit of the Early Bronze 2 period. 1, Syros Museum 173; 2, Herakleion Museum, from Lebena Tomb II, 343 (kindly drawn by Dr P. M. Warren); 3, Apeiranthos Museum 54; 4, Myrina Museum 694; 5, with cream-coloured slip, Apeiranthos Museum.

FIG. 20.7. Data from Bass 1967, Buchholz 1958, Stubbings 1951 and Tylour 1958.

FIG. 20.8. Reproduced by courtesy of Tavistock Publications.

The following figures are reproduced by courtesy of the Trustees of the estate of the late Sir Arthur Evans: 4.1; 4.3; 6.1; 6.2; 6.3; 6.7; 6.9; 15.8; 15.16; 16.2; 17.1; 17.4; 17.5; 18.5; 18.6; 18.7; 18.8; 18.9; 18.10; 19.3; 19.8; 19.12; 20.2; 20.3; 20.6; 21.2; 21.3; 21.4.

PLATES

Photographs by the author unless otherwise stated. Note that the measurements given are approximate only.

FRONTISPIECE Goulandris collection no. 142, ht 15.2 cm (photo Ivo Ioannidou and Lenio Bartziotis).

PL. 1 1, Ashmolean Museum 1938.727; 2, Copenhagen Nationalmuseum 476 (photo National Museum); 3, British Museum 43.5–7.75 (photo courtesy Trustees of the British Museum); 4, Thera Museum.

PL. 2 1, National Museum, Athens NM 6140, 6, 7, 9–11 (museum photo); 2, from Glypha in Paros, Athens NM 4762 (photo Zervos); 3, from Levkai in Paros, Ashmolean Museum AE 417 (photo courtesy Ashmolean Museum); 4, from Levkai in Paros, Ashmolean AE 415 (photo courtesy Ashmolean Museum); 5, from Amorgos, Ashmolean Museum AE 174 (photo courtesy Ashmolean Museum).

PL. 3 1 and 2, British Museum; 3 to 8, British School of Archaeology at Athens.

PL. 4 1, Musée du Louvre (photo Zervos); 2, National Museum, Athens; 3 to 6, sherds collected by author, now in British School sherd collection: 3 and 5 from Kato Akrotiri, Amorgos; 4 from Aila, Naxos; 6 from Aghios Panteleimon, Melos; 7 to 10, National Museum, Athens; 11, Naxos Museum; 12, British School Collection; 13 and 14, Aegina Museum.

PL. 5 1, Herakleion Museum; 2, Melos Museum; 3, Goulandris collection no. 94 (photo Ioannidou and Bartziotis); 4, Melos Museum; 5, British Museum; 6, Herakleion Museum.

PL. 6 1, British Museum 1912.6–26.11 (photo courtesy Trustees of the British Museum); 2, Goulandris collection no. 59 (photo Ioannidou and Bartziotis); 3, British Museum, TB 614 (photo courtesy Trustees of the British Museum); 4, British School Collection; 5 and 6, Herakleion Museum.

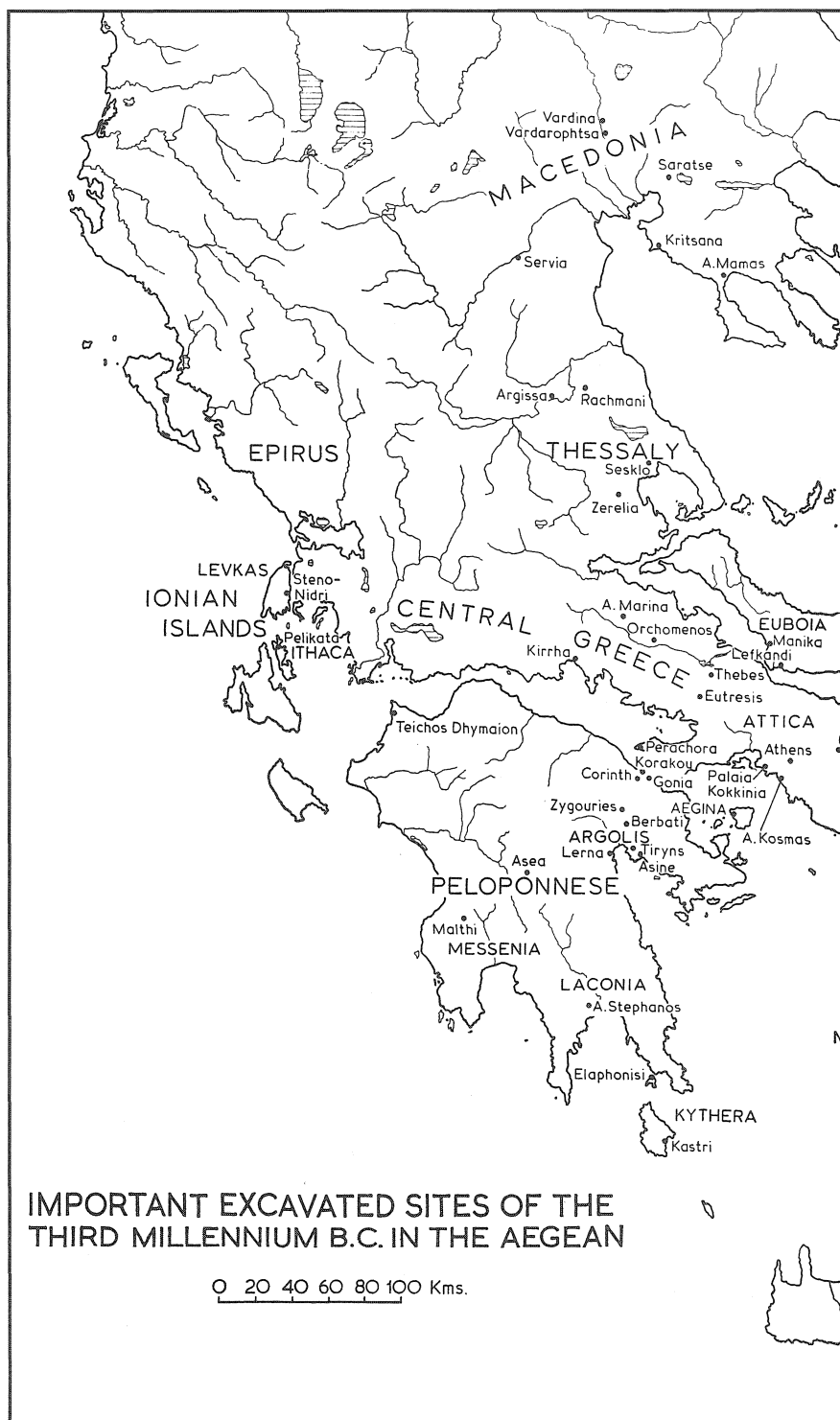
PL. 7 1, Syros Museum; 2 to 5, Athens National Museum (photos Zervos).

- PL. 8** 1 to 8, National Museum, Athens; 9, Melos Museum; 10 and 11, Syros Museum; 12 and 13, British School Collection; 14, Syros Museum.
- PL. 9** 1, Athens National Museum 4998; 2, Athens National Museum (photo Zervos); 3, Athens NM 5196; 4, Athens NM 5026; 5 and 6, British Museum.
- PL. 10** 1, Athens National Museum (photo Zervos); 2, Musée National Céramique de Sèvres (photo Zervos); 3 to 5, Athens National Museum; 6, Aegina Museum.
- PL. 11** 1, Musée National Céramique de Sèvres (photo Zervos); 2, British School Collection; 3, Herakleion Museum 4194.
- PL. 12** 1 and 2, Thera Museum; 3 and 5, Aegina Museum; 4, Archaeological Museum, Istanbul; 6, Ashmolean Museum AE 265.
- PL. 13** 1, Naxos Museum; 2, Stratigraphic Museum, Knossos; 3 to 6, National Museum, Athens.
- PL. 15** 1, Museum antiker Kleinkunst, Munich (photo Zervos); 2 (photo Hirmer).
- PL. 16** 1, Apeiranthos Museum; 2, Athens NM 6176 (photo Zervos); 3, Athens National Museum (photo Zervos).
- PL. 17** British Museum (photo courtesy Trustees of the British Museum).
- PL. 18** 1 (photo courtesy Italian School of Archaeology, Athens); 2, National Museum, Athens (after Brea); 3, National Museum, Athens; 4, Herakleion Museum (photo Hirmer); 5, National Museum, Athens (photo courtesy Bolletino d'Arte).
- PL. 19** 1, British Museum (photo courtesy Trustees of the British Museum); 2, Athens National Museum; 3, Musée du Louvre; 4, Athens, National Museum; 5, Ashmolean Museum AE 158 (photo courtesy Ashmolean Museum); 6, Goulandris collection no. 313 (photo Ioannidou and Bartziotis).
- PL. 20** Photos courtesy Professor J. L. Caskey.
- PL. 22** 1 and 2, Ashmolean Museum, AE 241 and 242; 3 to 5, Athens, National Museum (photo courtesy Italian School of Archaeology, Athens); 6 and 7, Ashmolean Museum AE 239 and 232 (photos courtesy Ashmolean Museum); 8 to 10, British Museum 81.5–9, 5 to 7 (photo courtesy Trustees of the British Museum).
- PL. 23** 1, a, after Caskey; 1, b, after Müller (photo courtesy German Archaeological Institute, Athens); 1, c, after Blegen; 2, Ashmolean Museum AE 159; 3, Athens National Museum (after Brea); 4, Herakleion Museum (Giamalakis Collection) (photo Hirmer).
- PL. 24** 1, Goulandris collection no. 329 (photo Ioannidou and Bartziotis); 2, Herakleion Museum (photo Hirmer).
- PL. 26** 1, Apeiranthos Museum; 2, Naxos Museum; 3, Paros Museum; 4 to 6, collected by the author, British School Collection.
- PL. 27** 1, Athens NM 3910 (photo Zervos); 2, Badisches Landesmuseum, Karlsruhe (photo Zervos); 3, Herakleion Museum (photo Hirmer).
- PL. 28** 1 and 2, Athens National Museum; 3 and 4, Ashmolean Museum 1938.725 and 1929.26 (photos courtesy Ashmolean Museum); 5 and 6, Herakleion Museum (photos Zervos).
- PL. 29** 1, Athens NM 4974 (photo Zervos); 2 (photo Hirmer).
- PL. 30** 1 and 2, Athens NM 4722 and 4723 (photo courtesy National Museum); 3 and 4, Herakleion Museum; 5, Ashmolean Museum AE 170 (photo courtesy Ashmolean Museum); 6, Ashmolean Museum AE 172.

PL. 31 Goulandris collection nos. 257 and 304 (photos Ioannidou and Bartziotis).

PL. 32 1, Copenhagen Nationalmuseet 4697 (photo Lennart Larsen); 2, Goulandris collection no. 252 (photo Ioannidou and Bartziotis); 3, Musée du Louvre (photo Zervos); 4, Athens NM 2309 (photo Hannibal).

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The disciplinary scene onto which *The Emergence* exploded in 1972 was, within Aegean prehistory, rather sleepy and self-absorbed. One has only to consult the invaluable monthly bibliographic newsletter *Nestor* (<http://classics.uc.edu/nestor/index.php/nestorbib>) to see to what extent the sorts of publications appearing at about the same time as *The Emergence* were mired in thick descriptive detail, and seemingly oblivious to the seismic changes that had been affecting archaeology elsewhere for a number of years. Truth to tell, even Renfrew's own first monograph, *Excavations at Saliagos near Antiparos* (1968)—a report on his important fieldwork, with John D. Evans, at the first Neolithic site to be investigated in the Cyclades—is fairly traditional in its format and general approach. (I recall a memorable dinner in 1973 at the home of the champion of the "New Archaeology", Lewis Binford, at which Colin's enthusiastic remarks about processual archaeology prompted Lew to fetch from his study a copy of the Saliagos monograph, only to tease him by reading out loud, in a mocking sing-song voice, the tedious details of an Appendix on fish-bone remains!) But *The Emergence*, published just four years later, was an altogether different kind of book. For this was a volume that not only deployed concepts and terminology radical in an Aegean setting—systems theory, cybernetics, locational analysis, statistics and quantification, and so on—but one that displayed an unusual and refreshing awareness of the wider world of archaeol-

ogy, especially in Mesopotamia, Mesoamerica, and Europe, as well as a warm sympathy for at least some of the tenets of the New Archaeology.

Initial reactions to the book on the part of established Aegean prehistorians, perhaps unsurprisingly, were very mixed. I remember chancing upon one of them flipping through the pages of a copy on display in the book exhibit at one of the Aegean Prehistory conferences held regularly at Sheffield University during the 1970s. She remarked, sniffily, that while the up-to-date summaries of data in the Culture Sequence chapters (5–13) looked useful enough, especially for the Cycladic islands, she could see little of interest or value to her in the rest of the book, and certainly did not plan to buy a copy. (In later years, I am pleased to report, she changed her mind.) Most of the early reviews focused myopically on quibbles about matters of factual detail and culture history, largely overlooking, or at least seriously underestimating, the book's more revolutionary aspects in terms of its emphasis on model-building, explanation, comparison, quantification, and a broadly anthropological approach. As Sinclair Hood remarked in his review (*Journal of Hellenic Studies* 93 [1973] 251–52), “Much tends to be esoteric by reason of the jargon used. To what extent the introduction of concepts and jargon from other disciplines helps our understanding of Aegean prehistory will be a matter of opinion.” Alleged “lapses into gobbledygook” and the “portentious jargon of anthropological Newspeak” evidently bothered Michael Walker (*Technology and Culture* 14.1 [1973] 78–81) as well: “there is also an unfortunate tendency at times to call a spade a ferrous implement employed in agricultural manual procedures, as it were.” As we look back almost four decades on, however, knowing the sorts of tangled knots into which archaeological prose would later become tied, especially as the New Archaeology came under critique by postprocessualism from the early 1980s, Renfrew's writing reveals itself as quite refreshingly straightforward and intelligible, whatever one may now think of its arguments.

John Boardman's review was one of the few to take the book seriously *as a whole*, praising it as “a notable work of synthesis and scholarship... [which] deserves a wide circulation,” and he had clearly grasped the overall message. Unfortunately, it was a message he did not wish to receive. He was sceptical of the “precipitate” endorsement of the “apparent” results of radiocarbon dating, as newly revised by dendrochronology (the subject of Renfrew's next book, *Before Civilisation* [1973]). And he was wholly unable to accept a largely endogenous account of culture change in the Bronze Age Aegean—that is, an emergence of civilisation dependent on local factors rather than external ones—which (not entirely without a certain logic, it must be said) he saw as the inevitable outcome of the chosen analytical model of sub-systems and feedback effects. His ultimate put-down was to assert that “in many respects Renfrew's account is simply a different way of saying what others have tried to say already.”

These, of course, were some of the reactions of an older generation of scholars. Colin Renfrew was 35 when *The Emergence* was published, and his most enthusiastic readers were certainly those of his own age or younger, especially postgraduate students. For them, the book seemed to provide all the wider context they had been seeking

for their individual studies; it offered new frameworks, a new rigor, a welcome shift to explanation as distinct from narration. Its impact was thus quite overwhelming, at least for those predisposed to be open to fresh ways of thinking about the past. In my own case—if the reader will indulge a moment of autobiography—it was literally life-changing.

In autumn 1971, I was an early-stage graduate student in a doctoral program in Classical Archaeology, gaining field experience by excavating in the Gymnasium Area of ancient Corinth. A mis-step as I framed a photograph from the edge of my excavation trench resulted in a 25-foot fall onto a very unforgiving Roman marble pavement—and a shattered right foot, rendering me useless for the remainder of the excavation season in a knee-to-toe plaster cast. As make-work, I was put to the study of some 30,000 very fragmented sherds of Early Helladic II pottery which had been found immediately above bedrock throughout the excavation area. Until then I had imagined myself writing a dissertation (and, I hoped, pursuing a career) in the field of Classical Archaeology; but working on this material gave me a new-found interest in Aegean prehistory, which I had previously encountered only through introductory survey-level courses. Returning to the University of Texas at Austin in 1972 to “write up the material” (as they say) for a Master’s thesis, and casting about for publications that might better contextualize my material, I stumbled across *The Emergence*, fresh off the press. It was a revelation. There I saw the much larger picture within which my own parochial assemblage could be fitted and have wider relevance. Obviously, I *had* to study with Colin Renfrew. I wrote to him in 1973, and he suggested a meeting in Santa Fe, New Mexico, at the time he would be a participant in the School of American Research Advanced Seminar on “Ancient Civilizations and Trade.” This too was a revelation, since there I encountered a number of my academic heroes, besides Renfrew—Bob Adams, George Dalton, Kwang-Chih Chang, Greg Johnson, Bill Rathje, Jerry Sabloff. Renfrew and I agreed to meet a few days later at Lew Binford’s house outside Albuquerque, and I was duly “interviewed” in his back yard for my suitability as a postgraduate student; Colin seemed more concerned with protecting the top of his head from the desert sun than with whether or not I was a worthy potential student! In any event, I was accepted and, somewhat to my own surprise, became an Aegean prehistorian. Dissertation completed, I was hired as Lecturer in Aegean Prehistory in the Faculty of Classics at the University of Cambridge, taking up my position, as chance would have it, on the very same day that Renfrew himself began his tenure as Disney Professor in the Faculty of Archaeology and Anthropology at Cambridge.

I tell this tale, because it was almost entirely my excitement about *The Emergence* that led me down this path. Its synthesis of Cycladic and Aegean prehistory, obviously, was on a scale and at a level of detail not previously attempted. But that is not what made it so very *different* from any previous book in the field. For many of us, both before and after *The Emergence*, Emily Vermeule’s *Greece in the Bronze Age* (1964), was the textbook that provided our *entrée* to Aegean prehistory; it was organized as a *story* about the prehistoric peoples of the Aegean, framed in terms of lively description of archaeological

and art-historical material, and a pseudo-historical, narrative structure. *The Emergence*, on the other hand, placed culture process and the explanation of culture change unabashedly front and center. By proposing causal, systems-based models, it seemed to provide, for the first time, a coherent, over-arching framework for trying to understand and explain how and why palace-based state polities emerged where and when they did in the Aegean Bronze Age. *The Emergence* placed Aegean prehistory squarely in face-to-face interaction with archaeologies well outside the Classical tradition, to a degree seen earlier perhaps only in the writings of V. Gordon Childe (to whose memory, very appropriately, *The Emergence* was dedicated). In fact, *The Emergence*, and the work it subsequently stimulated, could be said to constitute a major crossing of that divide separating anthropological archaeologies from those in the “Great Tradition,” about which Renfrew was to write a few years later in the *American Journal of Archaeology* (84 [1980] 287–98).

I sometimes wonder whether today’s students of archaeology experience anything akin to the buzz of excitement that permeated the field in the early 1970s. We looked forward with keen anticipation for the next issue of *American Antiquity* to arrive in our mailboxes, for the next publication by any of the leading luminaries of the New Archaeology, for the annual meeting of the Society for American Archaeology and (a little later) of the Theoretical Archaeology Group. There was a palpable sense—one could almost hear the creaking sounds—of a discipline changing direction, renewing and transforming itself in very significant and sometimes unexpected ways. The heady debates which swirled around us all are well reflected in the literature of the time, some of which naturally now seems very dated, but much of which has proven to be influential and of lasting value.

It is not simply the rose-tinted spectacles of retrospect that suggest to me that 1972, the year of *The Emergence*’s publication, was indeed an *annus mirabilis* for archaeological publication more generally. Aside from *The Emergence*, that same year saw the publication of Binford’s *An Archaeological Perspective*; David Clarke’s *Models in Archaeology* (and his influential ‘loss of innocence’ paper a few months later in 1973); Kent Flannery’s seminal article on ‘the cultural evolution of civilizations’; Michael Schiffer’s first paper on ‘archaeological context and systemic context’; widely influential books such as Marshall Sahlins’ *Stone Age Economics* and the first English translation of Fernand Braudel’s *The Mediterranean and the Mediterranean World in the Age of Philip II*; some important edited collections of papers and conference proceedings—for example, Eric Higgs’ *Papers in Economic Prehistory*, Mark Leone’s *Contemporary Archaeology*, Ed Wilmsen’s *Social Exchange and Interaction*, and the proceedings of the London meeting organized by Peter Ucko et al. on *Man, Settlement and Urbanism* (Renfrew’s own similar mega-conference, *The Explanation of Culture Change: Models in Prehistory*, followed hot on its heels the next year). As I explored in more detail in my contribution to *The Emergence of Civilisation Revisited* (2004), yet another 1972 publication of special salience for Aegean prehistory was *The Minnesota Messenia Expedition: Reconstructing a Bronze Age Regional Environment*, edited by William McDonald and George Rapp Jr—the first

truly interdisciplinary, regional-scale, problem-oriented research project in Greece. We can only speculate about how *The Emergence* might have been different had the Minnesota survey reached final publication a year or two earlier. In any case, the list of publications from 1972 is long and very impressive.

Notwithstanding *The Emergence*'s impressive pedigree, it is still a fair question to ask what justifies its reissue, without change, so long after its initial release. Very few books in archaeology, in fact, do enjoy second editions or reprints. Of course, certain textbooks which have hit on a winning formula are reissued (or, as their publishers like to put it, "refreshed") every 3 or 4 years, with new images and up-to-date case studies to take account of the latest discoveries in the field; Brian Fagan's *In the Beginning* is now in its 12th edition, his *People of the Earth* in its 13th, while Colin Renfrew's own *Archaeology: Theory, Methods and Practice*, with Paul Bahn, has reached its fifth edition, along with a shorter epitome, *Archaeology Essentials*. Other publications of long ago—Heinrich Schliemann's *Troia* and *Mykenai*, for example, or Sir Arthur Evans' *The Palace of Minos*—have been re-issued as facsimile reprints, on account of their historical significance in the field. But most books in archaeology are lucky to have a first edition, a paperback version, and a revised second edition a few years later. It is in general only books which have manifestly *made a difference* that enjoy a second life many years after their initial dissemination. Several of the works of V. Gordon Childe spring to mind, or Ian Hodder's *Symbolic and Structural Archaeology*, or Lewis Binford's *Debating Archaeology*.

In the case of *The Emergence*, many scholars have piled on to point out how thoroughly out of date it now is, in terms of the data on which it drew. As I have discussed in detail elsewhere (and I know he agrees), Renfrew's study just missed out on what is perhaps the most important revolution to have an impact on Aegean prehistory over the past several decades—namely, the advent of intensive surface survey and regional settlement pattern studies. In this respect, some sections of the book now read like a relic from an earlier, more innocent, age. The thorough-going new Introduction does an admirable job of bringing the reader up to date, most particularly in respect of research and discovery in the Cyclades during the third millennium BC—which was, after all, the central focus of *The Emergence*. There exist, furthermore, a number of relatively recent articles and edited volumes which provide useful overviews of the various parts of the Aegean world at different stages of its prehistory.

The Emergence was very much a book of its time, and no amount of updating to take into account subsequent discoveries could now turn it into a satisfactory *vademecum* for Aegean prehistory in the 21st century. But the reader should not think of this reprint purely as an historical exercise: that would be to treat the book as though it were a fossil fly trapped in amber. For, as Colin Renfrew emphasizes in his Preface that follows, many of the problems of explanation which *The Emergence* set out to tackle in strikingly original ways still remain important, fascinating, and for the most part not yet fully or satisfactorily resolved. Accordingly, the key question is how far his overall approach and underlying theoretical framework still have some validity, available for rethink-

ing and restructuring as part of the ongoing quest for more adequate understanding of the emergence of civilization in the third and second millennia BC in the Aegean. It is both an honour and a privilege to re-introduce one of the most important books in archaeology from the second half of the 20th century to a new generation of students and scholars, with the hope that they will find it as provocative and stimulating as I did many years ago.

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July 2009

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It is a challenge to introduce a work written nearly forty years ago. The reason for doing so is that the book is still in demand, which makes a reprint desirable. This may be an indication that several of the key ideas which it tries to develop still have some validity and value, and that the endeavour to give an account of the emergence of civilisation in the prehistoric Aegean is still worth contemplating.

XXVII

controversial ground) that the Greek language emerged in mainland Greece from its roots there which had already been present since the arrival of the first farmers already at the beginning of the neolithic period.

Naturally I am happy that *The Emergence of Civilisation* is to be reprinted, after so many years out of stock (a Greek translation was recently published: Renfrew 2006), and I certainly owe it to readers to indicate that several of the elements of the picture outlined here have altered with the developments in our discipline. It is a strange experience to return to the work and, by way of introduction, to review what elements in the perspective established then have changed profoundly, and which components seem to be of more lasting value. *The Emergence of Civilization* was prepared over a number of years, and its treatment of the Early Cycladic material was based upon my earlier doctoral dissertation (Renfrew 1965). Other elements were very much the product of the succeeding decade and of the impact of the developing themes of processual archaeology, still then regarded as 'the New Archaeology' (see Renfrew 1973c).

Although the possibility was offered to me by the publisher of this reprint of substantially revising the text of the book, that did not seem, on reflection, a very good idea. For at the detailed level there is now so much new information from survey and excavation and from the march of scholarship (see, for instance, the excellent review articles reprinted in Cullen 2001) that this would have to become a massive and very different book. It is better, I think, to acknowledge that this work is a product of its time. It is perhaps more profitable to compare the product of that era with what is now available from our own time today, and to learn from the contrasts as well as the continuities. For it was indeed one of the fundamental tenets of the New Archaeology of the 1960s and 1970s that the past does not simply reveal itself to us in the process of excavation and the attempts at reconstruction. On the contrary, it is the archaeologist who has to construct a picture of the past, who has to formulate what may seem valid generalisations and to generate explanatory hypotheses, and then bring new data to bear in order to confirm or to reject these. The New Archaeology involved the development of explicit theory, as well as what David Clarke (1973) was to call 'the loss of innocence'. It is from the theoretical discussions of the late 1960s that many of the subsequent debates in archaeology derive. Many of the underlying issues remain lively ones today.

In revising *The Emergence* one could certainly fill its pages with new discoveries and recent publications, and indeed I hope to refer to some of these in the Introduction which follows. But the weight of additional detail might also serve to mask the underlying intention and the ensuing theoretical approach which was perhaps the principal merit of the original enterprise. I would prefer the reader to see *The Emergence* as the exploration of a number of ideas about the past and about Aegean prehistory as well as a summary of the evidence such as was available up to 1972. Indeed the larger claim can be made that this was the first time that a specific case of the emergence of 'civilisation', or of a state society, or of a 'complex society' was explored at a detailed level, using what may be termed a processual approach. The interesting question for the reader of today is not so much to review the additional data that may now be available. It is rather to see

to what extent those ideas, and the underlying theoretical framework, still have some validity. It is to ask in what respects those ideas should now be changed or developed, and it invites the evaluation of the coherence of that theoretical framework. Such an evaluation was indeed undertaken on the thirtieth anniversary of the original publication, at a Round Table meeting held at the University of Sheffield, the papers of which have subsequently been published (Barrett and Halstead 2006). Ultimately it is for the reader, by reconsidering and perhaps restructuring the original ideas, and by bringing in the relevant new data, to construct for herself or himself a valid and appropriate picture of the emergence of Aegean civilisation.

Both need updating, and indeed are being continually updated, as the following Introduction seeks to indicate.

ACR

Cambridge, 16th June 2009

Introduction

THE INITIAL PERSPECTIVE

The Emergence of Civilisation was written as a deliberate attempt to offer a coherent alternative to the then prevailing view of the prehistory of Europe, including that of the Aegean, that it was the story of “the irradiation of European barbarism by Oriental civilisation” (Childe 1958a, 69). For reasons which I did not then well understand, but which were subsequently challengingly discussed by Bernal (1987), there seemed to be the underlying assumption that everything that mattered in European prehistory must have originated somewhere else. That somewhere was generally assumed to be Ancient Egypt or the early Near East, particularly Sumer. This was the doctrine of *Ex Oriente lux* which had been expounded for the prehistory of Europe by Oscar Montelius and developed by Gordon Childe in two admirably persuasive works: *Man makes Himself* (Childe 1936a) and *What Happened in History* (Childe 1942). This was the pervasive view for much of European prehistory, applying as much to the megaliths of north-western Europe (Renfrew 1967b) as to the copper age societies of the Balkans such as are seen at prehistoric Vinča on the Danube. It was applied also to the early bronze age of the British Isles (Renfrew 1968a) and indeed very much more widely. But it was a view which was no longer sufficient to account for the innovations which came about in prehistoric Europe. I had come to see this clearly when studying the supposed connections between the Cyclades and prehistoric Iberia and the Balkans while writing my doctoral dissertation (Renfrew 1965). The impact of radiocarbon dating confirmed the perception that the picture of the diffusion of culture from Egypt and the Near East to the Aegean, and so to the rest of Europe, was not one which had universal validity (Renfrew 1973b). Yet that diffusionist view, even if we can now recognise it as erroneous, did have a coherence which had been brilliantly expounded by Childe. This was, indeed,

the first coherent perspective which had been offered towards an understanding of the prehistory of Europe, albeit a flawed one. It was in recognition of Childe's achievement in formulating this powerful and pervasive model for the origins of Europe that *The Emergence* was dedicated to his memory.

Before disposing of the diffusionist view, however, it was necessary to put something in its place. It was necessary to offer a 'processual' account of the origins of Europe—that is to say one laying emphasis upon economic and social processes by means of which new societies were constructed—in place of the now-rejected diffusionist one. That is the task which *The Emergence* undertook for the prehistoric Aegean.

Yet whereas the calibrated radiocarbon chronology when applied to Europe was in itself sufficient to show the independence of the megaliths or the autonomy of the south-east European copper age (subsequently confirmed very convincingly by the finds at Varna), chronological factors alone could not do this for the Aegean. For even with the adoption of a calibrated radiocarbon chronology (as indicated in Chapter 13 here (see also Manning 2008), there is no doubt that that Old Kingdom Egypt and the early dynasties at Sumer long preceded the development of palace civilisation in the Aegean, first in Crete and then on the Mainland. The issue is not simply one of chronological priority. It is rather one of culture process—of understanding what were the processes within the Aegean which led to the development there of complex society.

It is indeed possible to document that Crete and Egypt were in fact in contact, and that Crete received Egyptian traded goods from the Early Minoan II period and perhaps earlier (Warren and Hankey 1989; Bevan 2004). There is no doubt therefore that it remains possible to develop a diffusionist model, as Childe and other scholars indeed did, whereby complex society arose in Crete *because of* such contacts. That was Childe's position, and it remains a perfectly reasonable hypothesis. Indeed it is one which was consistently maintained by Andrew Sherratt (1993), and has recently emerged anew with reference to the stone spools or weights of the Aegean early bronze age (Rahmstorf 2006). But the trouble is that it has very often been presented as a seemingly obvious conclusion to the discussion, rather than formulated as a hypothesis to develop. As an alternative it was necessary to devise a model, or a series of models, for the development of complex society in the Aegean. Trading contacts between the Aegean and the east Mediterranean may play a role in such models, as indeed they ought. But it does not follow from their existence that these constituted the major causative factor for the developments which took place in the Aegean.

It seemed to me in 1972—and it still does—that the contacts between the Aegean and the world of the East Mediterranean which could be documented for the third millennium BC were not, in fact, so numerous or so pervasive as to account for the striking changes which we see, and which led by the end of the millennium to the development of the palace societies of Crete. It seemed necessary therefore to develop an account in which the emergent features could be largely seen as endogenous—generated by processes at work within the Aegean region—rather than as exogenous.

That was the intention of the book. To achieve a coherent model, some framework was needed. It seemed that a systems analysis, which involved the division of the Aegean culture system into its constituent subsystems, would be an appropriate way to go about the task. This approach led to the development of the idea of the Multiplier Effect, a notion that still has some validity today. But it should be admitted that this procedure hardly offers a clear explanation of the specific form which complex society came to take in Crete and then in the Mycenaean world. The nature of those palace societies has now become clearer than it was 40 years ago, and the explanation offered then certainly does not succeed in predicting their special features. But the model did at least facilitate an analysis in terms of internally operating factors, without assuming that the motivating forces were always external ones. That was an advance upon earlier explanatory attempts.

Systems thinking, while very much in keeping with the scientific aspirations of the new or processual archaeology of the late 1960s, is sometimes stigmatised by the post-modern critics of today as being both mechanistic and positivistic (e.g. Hamilakis 2002). It stands accused by them of failing to give enough attention to human individuality, intentionality or agency. These are among the criticisms which were made, in its early days, by advocates of 'post-processual' archaeology. But while the insights of that 'interpretive' (hermeneutic) school have much to offer in a variety of ways which can profitably be developed, they rarely facilitate the rounded or multi-faceted approach which a coherent systems analysis can achieve, treating the subject both holistically and with a careful consideration of each of its components. Moreover to consider the consequences in aggregate of the actions of many individuals taken together does not imply that agency or the role of the individual actor has to be overlooked. The approach known as 'methodological individualism' (Bell 1994) allows the development of models based upon the decisions and behaviour of individuals, and which then go on to assess their aggregate effects.

Several leading Aegean prehistorians were also been content to analyse these developments largely in local terms (Branigan 1970; Warren 1975). This too is the perspective adopted by Oliver Dickinson (1994) in what perhaps remains the best general introduction available to the Aegean bronze age. But the contrary view has been vigorously argued by scholars such as Manning (1994) or Aruz (1999) and the issue remains controversial, and is further discussed below. It is worth emphasising that the view which an individual scholar takes on such issues is to some extent a product of the tradition of scholarship from which that scholar comes. Certainly there are some very different traditions of scholarship in use in the Aegean today. This was the point which I once sought to emphasise in a lecture delivered to celebrate the centenary of the Archaeological Institute of America (Renfrew 1980) in which I emphasised some of the features of the 'Great Tradition' of Classical scholarship, and stressed the 'great divide' which still separate such modes of thought from the approach to the subject favoured by the exponents of a more anthropological kind of archaeology. It still has some validity today.

THE DEVELOPING CONTEXT OF AEGEAN PREHISTORIC STUDIES

In discussing the emergence of Aegean civilisation it is necessary to take note of two developments in Aegean studies which bring us to a position very different from that of 40 years go. That was still in the immediate aftermath of the decipherment by Michael Ventris of the Linear B script of the Mycenaean Greeks. His great work with John Chadwick, *Documents in Mycenaean Greek*, was published in 1956. But although the early work of scholars such as John Killen began the investigation of the economic and social systems which these written records served, it is only in recent years that a clearer picture has begun to emerge, in which the evidence from the tablets can be brought into a perspective which assimilates the material evidence also. A series of publications such as those of John Killen, Louis Godart, Jean-Paul Olivier, Tom Palaima and John Bennet has now made progress with this task (e.g. Killen 1985; Killen and Voutsaki 2001). So that while Chadwick in *The Mycenaean World* (Chadwick 1976) could give an early view based primarily upon his reading of the tablets, the publication by Blegen, Rawson and their colleagues of the excavations at the Palace of Nestor at Pylos and the subsequent decades of research, make possible more integrated views, set out, for instance, in *Rethinking Mycenaean Palaces* (Galaty and Parkinson 1999; 2007). The literature cited there and by Shelmardine (1997) and Bendall (2007) offers an impression of the progress that has been made.

The view of the Mycenaean world which is developing today does indeed emphasise the role of the environment and the basic realities of the subsistence economy, factors which Braudel (1972) emphasised in his great work on the Mediterranean world, as I also had sought to do in *The Emergence*. The developing view has sought also to take account of social factors, both as documented by the material remains themselves and as illuminated by a fresh consideration of the tablets, as, for example, the examination of the *wanax* ideology undertaken by Kilian (1988), the excavator of Tiryns and by Wright (1995; 2004a). These insights offered by the Linear B tablets obviously relate to a late stage of the Late Bronze Age. They do however give us a much clearer insight into the achievements of that Late Bronze Age which were made possible by those of the preceding millennium which is our main concern here.

The second development which I would like particularly to emphasise is the whole new dimension to the picture which has been offered by systematic and intensive site survey. Of course twenty years ago Hope Simpson and Dickinson (1979) could offer a gazetteer of the known sites, just as I had done for the Cyclades in Appendix I to *The Emergence*. The practice of intensive site survey, however, is something different, involving the detailed study of very well defined areas, generally using a probabilistic sampling strategy. It allows a much more secure estimate to be formulated of site frequency. With the estimate of site sizes and of frequencies of size classes, a much more reliable estimate of population density becomes possible. The intensive study of a specific area was one of the objectives of the Minnesota Messenia Expedition (McDonald and Rapp 1972). Intensive survey was utilised by John Cherry in the course of our work

on Melos (Cherry 1982) and subsequently on Kea (Cherry, Davis and Manziourani 1991). Ambitious projects have been conducted by Bintliff and Snodgrass in Boeotia, by Jameson and colleagues in the Argolid (Jameson et al. 1994), in the Nemea Valley (Wright et al. 1990), and at what are now relatively numerous other areas within Greece (Bennet and Galaty 1997; Cherry 2003).

I emphasise these developments for two reasons. In the first place, they are among the most significant developments in the methodology and practice of Aegean archaeology over the past half-century. The rather rugged and arid nature of much of the terrain of Greece means that aerial photography is not so useful a technique for discovering hitherto unknown sites as it is in more humid areas, such as Britain. The application is in part regional, but it relates also to the understanding of the size and nature of individual sites.

Secondly it is in the light of such researches that one principal defect of *The Emergence* is now evident. The study in Chapter 14, 'Patterns of Settlement and Population in the Prehistoric Aegean' is now substantially out of date: more so, perhaps, than the other chapters (Cherry 2004). At the time it was written it made use of the available data, and some of the patterns indicated there, such as the distinction between north and south in the Aegean, remain valid. But the estimations of site densities are no longer acceptable approximations. Moreover the estimates of population densities fail to give adequate attention to the range of site sizes, often adopting what may now be felt an excessively large average figure for mean site size in each period (see Whitelaw 2004). These deficiencies became clear to me in 1975 and 1976 when John Cherry, in the context of the excavation project at Phylakopi in Melos, organised a site survey based upon probabilistic principles. This work was one of the key components in the resultant publication *An Island Polity, the Archaeology of Exploitation in Melos* (Renfrew and Wagstaff 1982), in which we sought to look at the entire history of the island, from the first visits by obsidian traders down to recent times. But in considering settlement distribution, to look at an island in isolation is not enough. That is one of the insights which lead Broodbank's *An Island Archaeology of the Early Cyclades* (Broodbank 2000) to interesting new conclusions.

REVISITING 'THE EMERGENCE'

THE NEOLITHIC BACKGROUND

Considerable advances have been made since 1972 towards an understanding of the Aegean neolithic. Indeed the mesolithic period which preceded it has now come into much clearer focus (Galanidou and Perlès 2003). The earlier stone age has been reviewed by Runnels (1995), and the paper by Demoule and Perlès (1993) conveniently reviews the literature, supplemented for north Greece by Andreou et al. (1996). The exhibition catalogue *Neolithic Culture in Greece* (Papathanassopoulos 1996) illustrated much new material and contains a number of well-focused essays, and a volume edited by Halstead (1999) tackles a number of themes of current interest.

For the earlier neolithic the impressive series of volumes emanating from the Franchthi Cave project offer the best documentation of the changes which took place in the transition from mesolithic to neolithic. Two major works broke important new ground: *Neolithic Greece* by Theochares (1981) examined a number of themes in an original way, while the treatment of neolithic Dimini by Chourmouziades (1979) gave an original treatment with a sophisticated theoretical perspective. Perlès (2001) has offered a convenient synthesis for the earlier neolithic.

Subsistence questions have been the basis for a number of extensive studies (e.g. Halstead 1996). The obsidian trade from Melos was the subject of a well-focused monograph by Torrence (1986) and trace-element studies have confirmed the use of Melian obsidian already during the Upper Palaeolithic period (Renfrew and Aspinall 1990). Perlès (1992) has made an original study of exchange and the organisation of production in the neolithic period. The excavations at Sitagroi near Drama, in addition to establishing the culture sequence in northern Greece in a clear-cut way (Renfrew, Gimbutas and Elster 1986; Elster and Renfrew 2003) have given clear evidence for the origins of copper metallurgy already during the late neolithic (Renfrew and Slater 2003)). The origins of metallurgy in the Aegean neolithic have also been reviewed by Zachos (1996; 2007) and by Nakou (1995), and some spectacular new finds reviewed by Demakopoulou (1998).

The neolithic of the Cyclades (reviewed by Davis (1992)) has been documented by a number of further studies, building on the information earlier obtained from Saliagos near Antiparos and from Kephala on Kea (Coleman 1977), to which can be added the important site of Ftelia on Mykonos (Sampson 2002). The question of the first colonisation of the islands has been systematically considered by Cherry (1990) and also by Broodbank (1999; 2000). Settlement remains from Grotta on Naxos have been discussed by Hadjianastasiou (1988), and the finds from the Cave of Zas by Zachos (1987; 1999). Neolithic finds from Thera have been well published by Sotirakopoulou (1999). Undoubtedly the most surprising finds have come from Strophilas on Andros (Televantou 2008a). There the fortification wall is the earliest in the Cyclades, perhaps in the Aegean. And the discovery there of rock engravings Cycladic long boats, resembling those incised on the 'frying pans' of Syros a millennium later, transforms our knowledge of early Aegean seafaring.

These various studies greatly extend and amplify the information in Chapter 5 of *The Emergence*. The final neolithic remains an important and little-understood period, whose chronology (see Johnson 1999; Manning 2008) has not been radically changed by recent studies, although more radiocarbon dates are now available than they were 40 years ago. Tomkins in his study of the period in Crete (Tomkins 2004) rightly puts the phrase 'The Neolithic Background' in inverted commas. The Greek neolithic is now a complex field of study in its own right (Souvatzi 2009): it cannot be regarded as merely a prelude to the bronze age.

THE EARLY CYCLADIC CULTURE SEQUENCE AND CHRONOLOGY

There is much new evidence now for the early bronze age from all parts of Greece. For the Cyclades one of the most important additions to our knowledge arises from the very careful and informative treatment of the Cycladic cemeteries by Doumas (1977), together with the full publication by Rambach (2000) of the cemetery finds, earlier published in more concise form by Tsountas, Stephanos, Kontoleon and other excavators. Barber (1987) contributed a useful overview, and Broodbank's major work of synthesis (Broodbank 2000) gives fresh insights on a number of themes. Useful essays are found in several collected volumes, edited by Davis and Cherry (1979), MacGillivray and Barber (19984), Fitton (1984), Cullen (2001); Barrett and Halstead (2004) and Brodie et al. (2008). Efi Karantzali (1996) in her study of the relations between the Cyclades and Crete in the early bronze age has given a very systematic overview (see also Karantzali 2008).

Post- excavation studies from the project organised by Caskey at Aghia Irini on Kea have continued to produce important material (Davis 1986; Wilson 1999) and the same is true of the early bronze age levels at Phylakopi on Melos (Renfrew and Evans 2007).

The most spectacular new site to be excavated in recent years is the settlement at Skarkos on Ios (Marthari 1990; 2008), with buildings preserved in place to a height of more than two metres, all assigned to the Keros-Syros culture. The fortified settlement of Markiani on Amorgos also provided rich deposits, with a well-stratified sequence (Marangou et al., 2006). The other evidence for Amorgos was reviewed by Marangou (1984; 1993), and the abundant materials from Naxos outlined and well-illustrated in an exhibition catalogue (Marangou 1990). The accumulating early bronze age evidence from Akrotiri on Thera has been considered in the comprehensive monograph by Sotirakopoulou (1999; also 1998), and is supplemented by material from deep soundings at the site (Doumas 2008). There are important cemetery finds from the Kouphonisia (Zapheirópoulou 1984; 2008). The looted site at Dhaskalio Kavos on Keros also contributed important new material (Renfrew, Doumas et al., 2007; Sotirakopoulou 2005). The position there has been transformed, however, by the discovery of an undisturbed 'special deposit' at Kavos. This gives clear evidence of ritual deposition of pottery, marble vessels and marble figurines, all deliberately broken at other locations and brought to this regional ritual centre for ritual deposition. (Renfrew, Philaniotou et al. 2007). Deposition began during the Keros-Syros culture and continued at lesser intensity to the end of the early bronze age. The nearby settlement at Dhaskalio, the largest now known from the Cycladic early bronze age (Renfrew et al. 2009), also began during the Keros-Syros culture but flourished notably during the Early Cycladic III period, before going out of use.

Various discussions about the Cycladic early bronze age culture sequence have taken place since 1972. The first was the work of Doumas (1977) who broadly concurred with the nomenclature developed in *The Emergence*, and used the terminology of 'groups' developed there (Kampos Group, Kastri Group etc.) while preferring the term Pelos-Lakkoudhes culture for what had been called the Grotta-Pelos culture. He added the

term Lakkoudhes Group for the earliest phase of this culture. These are questions mainly of preferred nomenclature, and do not reflect any disagreement between us about culture sequence or distribution. Broodbank (2000) in his very thorough treatment broadly uses the terminology followed in *The Emergence*, but he is critical of the notion of the Amorgos Group, finding it ill-defined. I now feel that he is broadly correct in this (although there are still some interesting features in the material assigned to the Amorgos Group, which may require further consideration).

One very important development is the general recognition of the significance of the Kampos Group. It is well documented by the cemetery on Ano Kouphonisi, excavated by Zappeiropoulou (2008), and in general scholars (e.g. Karantzali 1996; 2008) agree to situate it at the end of the Grotta-Pelos culture, or in a transitional position between the Grotta-Pelos culture ('Early Cycladic I') and the Keros-Syros culture ('Early Cycladic II'). Significantly, stratified deposits were found at the settlement of Markiani on Amorgos, thus confirming the chronological sequence on a settlement site (Marangou et al. 2006). The matter is made all the more interesting by the appearance of what appear to be imports of the Kampos Group at specific sites in north Crete (Betancourt 2008; Wilson, Day and Dimopoulou-Rethemiotaki 2008).

Mention should be made at this point of the careful and systematic study of the material from the Cycladic cemeteries undertaken by Rambach (2000a; 2000b), whose detailed presentation of the material is a major contribution to scholarship. He also undertakes a computerised seriation of the individual graves in the cemeteries, which has points of resemblance with the computerized seriation studies (Renfrew and Sterud 1969) that informed the treatment in *The Emergence*, although Rambach does not, in his bibliography, refer to that earlier computerized study (see also Hage and Harary, 2007, chapter 4).

One problem should be indicated with his ambitious seriation study (Rambach 2000b, Beilage 15), namely that most of the graves from Chalandriani on Syros are placed later than those from Naxos, the two islands most abundantly represented. For it seems unlikely that the inhabitants of Naxos undertook a migration to Syros. It is instead possible that the constraint of a single linear order is masking the second dimension of geographical placing—a problem central to the discussion in Renfrew and Sterud (1969). In that way the Syros and Naxos graves could be broadly contemporary, the difference in the seriation being due to factors other than chronology. Unfortunately Rambach's full similarity matrix is not published: it would have allowed the application of the close-proximity analysis method. But in any case the graves of his 'Panajia-Komplex' seem to correspond effectively with the cemeteries of the Grotta-Pelos culture, and his 'Aplomata/Chalandriani-Komplex' with those of the Keros-Syros culture. The difference seems to be principally one of terminology. At the close of his seriation there are just a few graves assigned to the Kastri Group, a position which is in harmony with the decision taken in *The Emergence* to place the Kastri Group towards the end of the Keros-Syros culture.

The Kastri Group has been at the centre of several chronological discussions which it now seems possible to resolve in the light of the excavations at the settlement of

Dhaskalio near Keros. It was in 1980 that MacGillivray published a well-documented account of the finds from earlier excavations at Mount Kynthos on Delos (1980), in which he made a typological division into two allegedly separable ceramic assemblages, although there was no stratigraphic evidence to support the distinction. The earlier of these he assigned to what had been termed the Keros-Syros culture in *The Emergence*. He also identified what he interpreted as a distinctly later phase, related to the finds of the Kastri Group. Following study, Barber and MacGillivray (1980) suggested a return to the old 'Early Cycladic I', 'Early Cycladic II', 'Early Cycladic III' terminology which I had sought to abandon in *The Emergence*, and claimed to identify evidence for a widespread 'Early Cycladic III' culture in the Cyclades on the basis of forms (mainly the one-handled cup, and the Trojan two-handled or 'depas' cup) which MacGillivray had separated on typological grounds at Mount Kynthos—in effect the Kastri Group as identified on pages 353-4 of *The Emergence*.

This proposal gave rise to vigorous chronological discussion, encouraging Rutter (1984), who had previously given careful consideration to the Aegean contemporaries of the Kastri Group (Rutter 1979), to suggest that there might be a hiatus of occupation on some islands. The matter was subsequently considered in considerable detail by Sotirakopoulou (1993), whose treatment returns to some of the factors emphasised in *The Emergence*. The recent excavations at Dhaskalio (Renfrew et al. 2009) have clarified the matter considerably and confirmed her view. The earliest phase there (phase A) is represented by typical pottery of the Keros-Syros culture. The main fabrics continue into the succeeding phase (B) which is distinguished by the presence, although not in large quantities, of pottery with forms and fabrics characteristic of the Kastri Group (including one-handled tankards and 'depas' cups). There is ceramic continuity into the following phase (C) which now has small quantities of forms and also incised decoration related to that of the Phylakopi I culture. There is continuity and no sign of a 'gap'. Sotirakopoulou, who is undertaking the study of the Dhaskalio pottery sees the development of the ceramic assemblage as one of continuity, where imports indicate the chronological distinctions. We both take the view that an 'ECI, ECII, ECIII' terminology is not particularly helpful. But if such a terminology is preferred, then the earlier Keros-Syros culture could be designated Early Cycladic IIA, and the late phase of the Keros-Syros culture indicated by the introduction of forms characteristic of the Kastri Group as 'Early Cycladic IIB'.

It should of course be noted that the characteristic forms of the Kastri Group are seen at Troy and at the important site of Liman Tepe near Izmir (Şahoğlu 2005) and their Anatolian origin, which has long been recognised, seems assured. Related but not identical material, also with Anatolian connections, has been found at Rivari on Melos (Televantou 2008b; Sampson and Fotiadi 2008).

The absolute chronology for the Cycladic early bronze age has been greatly advanced by the radiocarbon dates from Markiani on Amorgos (Renfrew, Housely and Manning 2006). There the Kampos Group can be assigned, very approximately, to the centuries between 3000 BC and 2800 BC in calendar years, with the Keros-Syros culture from

about 2800 BC to 2300 BC. The Kastri Group phase is placed between 2500 or 2400 BC and 2300 or 2200 BC. It should be noted how closely these dates compare with those proposed in *The Emergence* (Table 9.II), where the estimated chronology was about one century later. These conclusions anticipate the chronology proposed for the early bronze age by Warren and Hankey (1989; see also Manning 1995) which remains broadly valid.

SETTLEMENT AND SUBSISTENCE

It is in the field of settlement studies that the research into the Aegean early Bronze Age has advanced most strikingly over the past 40 years. As noted earlier, the development of systematic field survey has transformed the position (Cherry 2003). In the Cyclades, field survey has produced important new data (Renfrew and Wagstaff 1982; Cherry, Davis and Manziourani 1991). The study of individual sites has revised population estimates (Whitelaw 2004), so that the population figures proposed by Broodbank in his thoughtful and careful survey (Broodbank 2000) differ significantly from those developed in Chapter 14 of *The Emergence*.

In the Cyclades, few settlements of the early bronze age have been excavated and published over the past 40 years. The investigation of Aghia Irini in Kea was already well underway by 1972, and the ensuing publications have been very important (see Wilson 1999). The excavations at Phylakopi in Melos (Renfrew 2007) revealed only limited areas of early bronze age levels, but these are certainly of considerable interest (Renfrew and Evans 2007; see Whitelaw 2004). As noted above, the most comprehensive excavation has been at Skarkos on Ios (Marthari 1990; 2008). The settlement at Markiani on Amorgos has been published in some detail (Marangou et al. 2006), and was fortified already at the beginning of the early bronze age. However, this is less surprising when one recalls the recently identified fortifications at neolithic Strophilas on Andros (Televantou 2008a). Material from the excavations of Doumas at Panormos on Naxos has now been published (Angelopoulou 2008). The settlement on Dhaskalio near Keros is of particular importance for the last phase of the early bronze age (Renfrew et al. 2009). The recognition of the ritual centre at Kavos on Keros (Renfrew, Philaniotou et al. 2007) also changes the picture set out by Broodbank (2000), for this important site on Keros is seen now as rather different in character from the major commercial centres which he identified, like Chalandriani on Syros or Grotta on Naxos.

Beyond the Cyclades the picture of early bronze age settlement has been transformed by a series of new discoveries. In Crete, the important site of Myrtos (Warren 1972) remains the most comprehensively excavated and studied, and has permitted interesting reinterpretation (Whitelaw 1983; 1994). The transformation of Petras from a Prepalatial settlement to a Protopalatial centre is of particular interest (Tsipopoulou and Wedde, in press), and the important gateway port of Poros-Katsambas has been investigated (Wilson, Day and Dimopoulou-Rethemiotaki 2008).

In the east Aegean there is significant new work from Troy, and the site of Poliochni on Lemnos has been the subject of study (Doumas and La Rosa 1997). Among the most

interesting work has been the investigation of sites in the Izmir region, notably Liman Tepe (see reports in Doumas, in press; also Sahoğlu 2005).

However the mass of new material from important sites such as Palamari on Skyros (Parlama and Theochare, in press), or Archotniko in Macedonia (Pilali-Papasteriou and Papaefthymiou-Papanthimou 2002) is too copious to be reviewed here. Much important material was presented at a conference held in Athens in 2008, the proceedings of which are soon to be published (Doumas, in press). That publication will effectively update the settlement picture. There are many new finds from Mainland Greece (Kouka 2008). The importance as a trading centre of the settlement of Kolonna on Aegina is becoming increasingly apparent (Gauss and Smetana 2008).

Considerable progress has been made also with studies of the subsistence base in the early bronze age. In some respects the broad outlines follow those formulated in *The Emergence*, which were based, to a significant extent on the studies of Jane Renfrew (1973). However the conclusions offered there about the inception of viticulture and olive cultivation in the early bronze age have been questioned by Hansen (1988) and discussed recently by Hamilakis (1996; see also Palmer 1994). Yet the evidence that the grape was domesticated by the early bronze age seems well documented by the finds at Sitagroi (J.M. Renfrew 2003), and the profusion of drinking cups does support the case for wine at that time. Moreover the considerable emphasis placed in recent studies upon the role of feasting in the bronze age (e.g. Wright 2004b; Hitchcock et al. 2008) has again drawn attention to the likely role of wine already in the third millennium BC. For instance the abundance of sauceboats in the Special Deposit at Dhaskalio Kavos on Keros (Renfrew, Doumas et al. 2007) tends to support the view that these were drinking vessels, used for the consumption of wine. I would also myself still stand by the arguments given in *The Emergence* for the use of olive oil at that time.

In an influential series of papers Halstead (1995; also Halstead and O'Shea 1982) has reconsidered some of the social implications of the subsistence strategies of the early bronze age (see also Pullen 1992). He has made a very good case for questioning the emphasis laid in *The Emergence* upon the redistribution of commodities, and has developed such new concepts as 'social storage' to probe the relationships between subsistence and aspects of social organisation including personal ranking. Certainly the suggested role of the Mycenaean places as redistributive centres, playing a central role in the general subsistence economy can now be questioned (Halstead 2004). Such redistribution as occurred was probably on a more modest scale (see the papers in Killen and Voutsaki 2001; also Galaty and Parkinson 1999).

If it is the discussion of settlement in *The Emergence* which is most in need of revision, the discussion on subsistence and its interactions with the social system is most in need of development. This is a task which has already been initiated successfully by Halstead and his colleagues. We see important clues in the use of seals and sealing already in the early bronze age (Pullen 1994; Zachos and Dousougli 2008). The development of Mediterranean polyculture is likely still to play a central role in this picture, even if it was not through the rather simple kind of redistribution originally proposed.

METALLURGY AND OTHER CRAFTS

The emphasis laid in *The Emergence* upon the development of metallurgy has been confirmed by later work. As noted above there is now much more evidence for metallurgy in the late neolithic of the Aegean, which may now be considered to be in reality a 'copper age' just as much as in the Balkans (Nakou 1995; Zachos 1996; Zachos 2007). The evidence from Sitagroi (Renfrew and Slater 2003) supports the view advanced earlier that copper metallurgy may have come to the Aegean from the Balkans, already during the neolithic period. New finds of goldwork, some unfortunately without provenance (Demakopoulou 1998), suggest that in Greece as well as at such Balkan sites as Varna, metals were achieving a high prestige value already in the later neolithic.

Gradually it is becoming clear that sophisticated techniques, such as the cupellation of lead to yield silver, were developed, as early as the Early Helladic I period. Work on copper sources, for instance on Seriphos and Kythnos has been undertaken (Hadjianastasiou and MacGillivray 1988; Bassiakos and Philaniotou 2007). And it is clear that suitable locations for smelting were chosen which were not necessarily adjacent to the sources—both in Crete (Day and Doonan 2007) and in the Cyclades (Georgakopoulou 2007).

Branigan's full survey of early Aegean metalworking (Branigan 1974) supplemented by that of Tripathi (1988) and of Nakou (1995) serves to reinforce the clearly central role of metal and metalworking among the crafts of the Aegean bronze age. Their importance for trade and interaction is further considered below. In this context the value of lead isotope analysis for the characterisation of copper as well as lead and silver should be noted (Gale and Stos-Gale 1984; 2008; Stos-Gale et al. 1984)).

The importance of vessels of precious metal, already emphasised in *The Emergence* (plate 19) is further documented by the find of a silver cup or bowl in the Tsikniades cemetery in Naxos (Philaniotou 2008, fig. 20.19). The recognition of the role of feasting during the Aegean bronze age (Wright 2004b; Hitchcock et al. 2008) serves to emphasise the importance of conspicuous consumption exemplified by the consumption of wine from such prestigious vessels.

The early development of other Aegean crafts is becoming increasingly well understood, as a series of papers at a recent conference document (Laffineur and Betancourt 1997). Broodbank (1989; 2000) has returned to the issue of Cycladic shipbuilding and its implications. Once again, however, discoveries from the final neolithic period, such as the Cycladic longboats depicted on the rock engravings at Strophilas on Andros (Televantou 2008a) are serving to place key innovations much earlier than had been realized. Indeed a number of the most significant innovations can now be traced back before the inception of the early bronze age.

Studies in ceramic petrology are now contributing not only to an understanding of trade and interaction, but also to questions of production and organisation (e.g. Day et al. 1997). Other crafts, such as the working of obsidian (Carter 2008) are becoming better understood. The production of stone vessels in the Cyclades has been the subject of a comprehensive study (Getz-Gentle 1996), and once again the inception of this craft goes back to the later neolithic period.

The most impressive synthesis of recent years in relation to craft technology and craft production is Elizabeth Barber's magisterial *Prehistoric Textiles* (Barber 1991). The most abundant evidence naturally comes from the later bronze age, and she documents most persuasively the weaving skills (and associated trades) of Minoan Crete. Her discussion does however extend back to the early bronze age, notably Early Minoan Myrtos. There is therefore much new evidence to reinforce the views expressed in Chapter 16 and 17 of *The Emergence* that it was already in the early bronze age that the economic foundations of the Aegean civilisations were laid.

SOCIAL SYSTEMS

Progress in understanding the social organisation of the Aegean early bronze age has not advanced as much as for the later bronze age. For that period the palaces with the Linear B tablets offer many opportunities (Kilian 1988; Killen and Voutsaki 2001; Shelmerdine and Bennet 2008). Study of burial practices has brought further social insights (Voutsaki 1995). The position has been conveniently reviewed in a volume edited by Niemeier and Laffineur (1995) and in papers by Wright (2004a).

For the early bronze age, site survey is beginning to bring rewards, and individual sites have been re-assessed, notably Myrtos in Crete (Whitelaw 1983; Whitelaw 1994) and Poliochni in Lemnos (Doumas and La Rosa 1997). For the Greek mainland, the importance of 'Corridor Houses', of which the most famous is the 'House of the Tiles' at Lerna, has been well reviewed by Pullen (2008).

For the Cyclades, the Cycladic cemeteries still offer the principal insights that we have in the area of social differentiation. The excellent work of Rambach (2000a; 2000b) builds mainly on earlier excavations, and makes use of the excavations of Kontoleon at Aplomata on Naxos, which have sadly not been fully published. The excavations of Doumas in the 1960s (see Doumas 1977) and the excavations of Zapheiroupolou (1984) in the Kouphonisia have added to the corpus, as have those of Philaniotou (2008) at Tsikniades on Naxos.

When I reviewed the position in *The Cycladic Spirit* (Renfrew 1991, 23-4) I lamented that circumstance that so much Early Cycladic material in the museums of the United States and of Europe lacks provenance, the consequence of the looting of the Cycladic cemeteries that has been intensive since the Second World War. In a careful analysis by Gill and Chippindale (1993) and in a review of the book by Elia (1993) strong criticisms were made of the role of the private collector in sustaining the looting process by the purchase of unprovenanced antiquities. They argued persuasively that this criticism is valid as much for the collector residing within Greece as for the collector overseas. The crucial rupture takes place when artefacts are separated from their original context and all evidence of their associations with other artefacts in the grave or settlement is lost. They lose their power to tell us more about the past: by comparison the question as to whether looted artefacts finally end up in a museum in Greece or a museum in the United States is of little consequence. I now agree with those critics (Renfrew 2000), and concur that a responsible scholar should not legitimise the acquisition of looted

antiquities by undertaking their publication, even when their retention in a collection within Greece prevents their going overseas. Publications like *The Cycladic Spirit* (Renfrew 1991), or the catalogue of the major Karlsruhe exhibition composed almost entirely of looted materials (Thimme and Getz-Preziosi 1977)—although that was not much noted publicly at the time—or other compendia of looted materials (e.g. Getz-Preziosi 1988) make little contribution to scholarship or to our knowledge of the past. On the contrary they legitimise the looting process which has so impoverished our potential for understanding Early Cycladic social structures, now or in the future.

Fortunately, however, evidence from the Cycladic settlements is beginning to open further avenues of study. Two categories of material are particularly promising, although their implications are not yet entirely clear. The first are the beautifully worked ‘pestles’ or ‘spools’, made either from *Spondylus* shell or choice stone, which are now recognised from several Cycladic settlements, notably Markiani on Amorgos (Marangou et al. 2006, 176–7) and Dhaskalio near Keros (Renfrew, Philaniotou et al. 2007, 127, fig. 15). These small objects are also well known from Early Helladic Greece, where Rahmstorf (2003; 2006) has made the interesting suggestion that they served as weights. Many elements of the case which he sets out are persuasive, although at Dhaskalio and in the Special Deposit at Kavos, they seem too numerous to be simply weights, and some further function may also be implied.

The second category is the clay sealings, which might be compared with those of the House of the Tiles at Lerna (*Emergence* 113, fig. 77), although we do not yet have such a clear context for them in the Cyclades. One important group comes from the Cave of Zas on Naxos (Zachos and Dousougli 2008), while from Markiani on Amorgos there is a lead seal as well as clay sealings (Angelopoulou 2006), to be compared with an example from the Greek mainland at Tsoungiza (Pullen 1994). These are fascinating finds, and they clearly indicate some degree of organisation in the production, allocation and consumption of commodities, including foodstuffs. Such reasoning led to some emphasis upon the concept of ‘redistribution’ in *The Emergence*. But, as noted above, Halstead (2004) and others have shown that the notion of ‘redistribution’ is an oversimplification when applied to the Minoan or Mycenaean palaces and their organisation of food supplies. So simply to apply the label of ‘redistribution’ is insufficiently precise. Indeed it is not yet clear what sort of organisation these finds imply. That remains a project for the future.

In the same way, the developments in social ranking which we glimpse in the early bronze age still remain to be clarified. The term ‘state’ as a social classification is now widely applied to the Minoan and Mycenaean palace societies of the late bronze age (e.g. Shelmerdine 2008). And to speak of the emergence of ‘chiefdoms’ in the early bronze age is not uncommon (e.g. Pullen 2008). But I accept the criticisms which have been made of this term (e.g. Wright 2004a). It may be right to imply that there are forms of organisation and of personal ranking in operation during the early bronze age which herald in a modest way those of the Minoan-Mycenaean state. But at the same time the term ‘chief’ is too vague. We do not yet understand very well the social organisation

of the early bronze age societies of the Aegean. The encouraging appearance of new material bearing upon the issue is perhaps an indication that in a few decades we may know better.

PROJECTIVE SYSTEMS: COGNITIVE ARCHAEOLOGY

One of the criticisms frequently levelled against the processual archaeology of the 1960s and 1970s is the emphasis given to environmental and subsistence matters—the so-called functional-processual archaeology—at the expense of the symbolic dimension. Yet I would claim that in Chapter 19 of *The Emergence*, ‘Symbolic and Projective Systems’, these matters were dealt with, if only in a preliminary way, in a manner which sought to integrate them within the culture system as a whole. This was a theme which I developed in my Inaugural Lecture in the University of Cambridge (Renfrew 1986), and in the further development (Renfrew 1998a) of what has been termed cognitive-processual archaeology. For I would argue that the same procedures of reasoning which we apply to subsistence or economic subsystems may profitably be applied to social and cognitive (or ‘projective’) subsystems also.

Indeed, although the ideas certainly need further development, I think it might be argued that the guiding concepts outlined in Chapter 19 of *The Emergence* would be some of the key issues to be addressed in outlining the cognitive archaeology of any culture. It can be argued that the story of human cultural development is very much one of increasing *engagement* with the material world (Renfrew 2001; 2004; Malafouris 2004), and that this engagement develops and intensifies with the development of such concepts as ownership, value and commodity, as well with the inception of such specific adaptive concepts as weight and measure. The first section of the chapter in question is headed: ‘The description of the physical world’, dealing first with mensuration and number, and then with writing, and then the depiction of the world. The second section, ‘Society as a projection of itself’, deals with symbolic evidence and with the development of what would today be termed ‘reflexive’ concepts, which open the way towards the symbolic ordering of society and formalised notions of rank and role.

The third section, entitled ‘Technology for the unknown’, involves what we may term the engagement with the supernatural. It deals first with the archaeology of cult (‘Technology for the Living’) and then with funerary practices (‘Technology for the Dead’). The final section, ‘Technology for pleasure: beauty, style and play’, addresses a number of aesthetic issues which have yet to be fully explored in archaeology. I tried to deal with some of these in *The Cycladic Spirit* (Renfrew 1991), and find very interesting some of the problems surrounding those remarkable sculptures, the folded-arm figures of the Cyclades. Some of the questions raised by Patricia Getz-Preziosi in her *Sculptors of the Cyclades* (Getz-Preziosi 1987), such as the identification of individual hands and the use of canons of proportion, seem to me very interesting. But unfortunately this field has been hampered by the high proportion of pieces which are unprovenanced (and thus of uncertain authenticity) and by the very real ethical problems mentioned in the last section.

Each of these fields has been developed considerably in recent years. The use of seals and sealings, discussed above, clearly introduces what may be regarded as a recording system, although one that does not involve the sort of sequence of symbols implied by the term 'writing'. The development of such recording systems is often associated with the development of measurement, and that theme was introduced in *The Emergence* (p. 409) with reference to the silver ingots from Troy. It is interesting therefore that Rahmstorf (2003) has identified the 'spools', of the early bronze age, briefly discussed above, as functioning as weights. Certainly the find of such a spool, made of lead, and with some indication of measure (Renfrew, Philaniotou et al. 2007, fig. 15, 12) from Dhaskalio, Keros gives strong support to his position.

The development of belief systems is clearly a vast field, and progress has been made in recent years with the study of the religions of the Aegean bronze age. For the late bronze age, in particular, there are abundant finds now relevant to this theme (see Hägg and Marinatos 1991; also Renfrew 1985). And there the evidence of the Linear B tablets gives important new insights (Bendall 2007; Palaima 2008).

Several studies have dealt with aspects of early bronze age religion in the Aegean, of which the most original may be that of Goodison (1988; also Goodison and Morris 1998; Kyriakidis 2005). New insights are emerging from the Early Cycladic ritual centre at Dhaskalio Kavos (Renfrew, Philaniotou et al. 2007; Renfrew, Dumas et al. 2007). There numerous cases of 'structured deposition' occur, consisting of already broken pottery vessels, smashed marble bowls and shattered marble figures (as well as broken 'spools' of the kind discussed earlier). These already broken materials were brought from other islands of the Cyclades, and maybe from further away. The implication must be that they were used in rituals in their islands of origin, including perhaps ritual processions, and deliberately broken at the end of their use life, a portion of the residue being taken for deposition to Keros. The issue of deliberate and systematic breakage has come to the fore in Aegean prehistory, both with respect to figurines (Chapman 2000) and pottery (Pantelidou Gofa 2008). The use of the Cycladic sculptures in processions has already been suggested by Hoffman (2002) and by Hendrix (2003). It is clear now that they were not made simply for burial in the Cycladic cemeteries.

The finds at Kavos produce further insights which may be relevant. There is clear evidence of a powerful belief system at work here. As noted earlier, the broken drinking cups may well imply, at Kavos, the role of feasting and of libations, now richly documented in the later bronze age (Hitchcock et al. 2008). As so often, the evidence, although abundant, is difficult to interpret. It is fair to say that these and other finds now take the archaeology of cult back to the early bronze age, and perhaps beyond.

INTERACTION AND INNOVATION

Social relations may be described in terms of interactions, and interaction at a distance is manifested most directly in the archaeological record through trade. So that for the archaeologist the study of the flow of goods offers very good insights into an early society, and serves as a marker for, as well as a stimulus towards, social change. Trade

is allied closely to communication and to innovation, as chapter 20 of *The Emergence* asserted (see Helms 1988).

The study of trade and interaction in the Aegean has always been conducted in the first place in terms of pottery, and pottery remains in many ways the most useful indicator for it. It is not possible here to review the development of ceramic studies throughout the bronze age Aegean, although one may certainly stress that the further development of ceramic petrology (e.g. Day et al. 1997) has been of great value in the Cyclades as elsewhere. Obsidian is an obvious material for study in the Aegean and has been the subject of the useful monograph by Torrence (1986). The most important technical advances have probably been in the field of metal characterisation, where lead isotope analysis has led to a series of interesting studies (e.g. Gale and Stos-Gale 1984; 2008): the metal trade in the Aegean is now very much better understood than it was thirty years ago. However not all trade goods survive in the archaeological record, and here other sources of information must be used beyond archaeometric characterisation studies. In this respect the study of the textile industry by Barber (1991) is outstanding.

When it comes to integrating such information into the wider picture and reaching some broader understanding of the processes of change, there has been less progress in recent years. A broad, comparative perspective, relying upon ecology and the principles of island biogeography has been used by Cherry (1990) to discuss initial island settlement, and this approach has been usefully followed by Broodbank (1999; 2000), and further applied by him to social interactions taking place among the islanders in the early bronze age.

When it comes to the transition to state society, however, there has been less progress. The gradualist approach adopted in *The Emergence* has been profitably questioned by Cherry (1986) who suggested a view where the processes at work have a pace more akin to the 'punctuated evolution' trajectory proposed by evolutionary biologists. Other approaches have been discussed by Van Andel and Runnels (1988), while, as noted earlier, Manning (1994) would still assign a dominant role to contacts between the Aegean and the Near East. Advocates of a 'world system' approach (e.g. Frank 1993; Sherratt 1993) sometimes seem to be reasserting what is largely the old diffusionist view of Childe, but reformulated in a novel vocabulary. The notion of interaction among equals, which has been termed 'peer polity interaction' (Renfrew and Cherry 1986), offers an alternative to this diffusion-based view and has been utilised by a number of scholars.

At the same time, however, more specific and well-argued cases for significant external influence, based upon the assessment of new evidence, have recently been developed. The first is the undoubted influence of pottery motifs of Anatolian origin during the later part of the Early Helladic II period of mainland Greece (the Lefkandi I culture) and of the later Keros-Syros culture of the Cyclades (the Kastri Group) as discussed earlier. The Anatolian picture has been clarified recently by the discoveries at Liman Tepe (Sahoglu 2005) and generalized by Efe (2007), although care must be taken with the chronology. So it is perhaps understandable that Weingarten (1997) should see the sealings in the House of the Tiles at Lerna as suggesting that Lerna might have been

a trading post established by Anatolian traders. Certainly some commentators (such as Aruz 1999) see the inception of seals in the Aegean as the result of 'oriental' impact. When we take into consideration also the theory of Rahmstorf (2003; 2006) that the metric systems which he discerns in the Aegean spool-shaped weights of the time are of Near Eastern origin, then quite an impressive case has been made.

But a more nuanced approach is perhaps required. Just as seals and sealings need not necessarily indicate redistribution in the now conventional sense, nor need they be taken as an indication of external trade, as Weingarten implies—and indeed it is not clear at all that seals and sealings were in intensive use in western Anatolia at that time. While the form of the seals and some of their designs may well be of East Mediterranean origin, as Aruz (1999) asserts, this point was recognised long before *The Emergence* was written in relation to the ivory seals of Crete. But that does not necessarily imply that their use, and the organisation which these sealings implies can be regarded as exogenous. There is a respectable ancestry in the Aegean and the Balkans for what may be termed 'stamp seals' (Makkay 1984). It is only four decades since the distinguished Sumerologist Falkenstein (1965) was proclaiming the Sumerian nature of the 'writing' on the Tartaria tablets of Romania. But the rich Balkans and Aegean context for the 'cylinder seals' of the Late Neolithic (Renfrew 2003) makes unnecessary any appeal to direct Near Eastern contact at that time.

New material relevant to these questions will no doubt soon become available. But at present it seems safest to regard the House of the Tiles (Peperaki 2004) and the other Corridor Houses (Pullen 2008) of the Korakou culture (Early Helladic II) as products of local development. The excavations at Dhaskalio, Kavos support the notion of continuity during the Cycladic early bronze age. Pottery of the Kastri Group makes its appearance there, to be sure, but in small quantities and as imports. The 'international spirit' of the Early Bronze 2 period in the Aegean is evident, indeed highly visible, during the Korakou culture (Early Helladic II) and the Keros-Syros culture before the appearance of forms of the Lefkandi I assemblage and the Kastri Group. There is a dynamic of growth and development in different regions of the Aegean at this time. Nor should the focus be exclusively upon contacts with the east: Maran (1998) has rightly emphasised the role of the western seaways, for instance along the Dalmatian coasts. Certainly the communities of the Anatolian coast played a major role in these developments. And certainly there were beginning to be contacts with the East Mediterranean and with Egypt

In his recent review of the import of Egyptian stone vessels to Crete, Bevan (2004, 120) remarks that it was "correct to downplay the role of these objects as prime movers in the emergence of palatial society on Crete, let alone in the emergence of 'civilization' in the wider Aegean" The same is likely to apply to Near Eastern motifs on Aegean seals, or indeed to the development and use of weights. It was later that things changed more radically and interactions became more intense: this was at the end of the early bronze age, with the introduction of sailing ships in the Aegean (*Emergence* fig. 17.6 and pl. 28; Broodbank 2000).

There is much still to learn. It may be that a clearer picture is beginning to emerge of the transition towards state society in the bronze age Aegean (e.g. Wright 1995). But it is fair to remark that there is real difficulty in striking the balance between a general explanation of broad explanatory power, but which may lack the specific application to the particular case in question, on the one hand, and on the other the rich and detailed description which may only have a somewhat indirect reliance upon clear explanatory principles. This is the old dilemma in formulating an effective explanation, not so far removed from the long-familiar polarity between historical explanation (rich in detail and the understanding of the particular) and scientific explanation (with powerful general principles but offering little insight into the particulars of the specific case, and perhaps a shade mechanistic). The polarity remains!

LONG-TERM CONTINUITIES AND THE ORIGINS OF GREEK ETHNICITY

The focus of *The Emergence* was naturally upon the early bronze age of the Aegean, although concerned also with the later bronze age societies of the region. One theme, as noted above, was to assert continuity with the preceding neolithic period and to offer an explanation of the transformations taking place in terms of endogenous processes, of processes operating within the Aegean. The explanation may have been an imperfect one, but the aim continues to seem appropriate. Moreover the new data which have become available over the past 40 years do not, to my mind, suggest a different view. On the contrary they would seem to indicate that such an explanation may well prove possible, even though it may be more complicated than the one which I outlined, and with different emphases.

I would like to go on now to make the further, and perhaps bolder, claim that the transition from bronze age to iron age may be viewed in similar terms, and that we are in fact speaking of continuities which may be traced through from the neolithic right on to the Classical Greece of the fifth century BC. Again to say this is not to question the importance of wider Mediterranean interactions at different periods: it is simply to deny them a dominant role in the overall processes of change.

Of course the whole issue of the 'Dark Ages' and the transition from Mycenaean to Archaic Greece is too vast a theme to discuss in detail here. Many distinguished writers have already done so in terms which I admire, including my colleague Anthony Snodgrass and my former colleague Ian Morris (see Morris 1994; also Whitley 1991; Dickinson 2006). It was not until I had the task of studying the materials from the Mycenaean sanctuary which our excavations at Phylakopi on Melos had the good fortune to reveal (Renfrew 1985) that I became more familiar with the late bronze age evidence, and came to perceive how the development of Aegean religion in Crete, Mainland Greece and the Cyclades, could well be viewed as a series of transformations, each building upon the experiences of the preceding phase, from the neolithic period through to the religion of the Classical Greeks.

Such a view would not be thought too outrageous by most Aegean prehistorians and classical archaeologists today, I believe, were it not for the circumstance that the Greek language is a member of the Indo-European language family. This is felt to constitute a difficulty for an advocate of continuity. For it is almost universally assumed (albeit without much tangible evidence) that there was a migration of Greek-speakers or of Indo-European speakers into Greece during the bronze age. This, it is argued, was responsible for bringing Greek (or at least Indo-European speech) to an area which on the classical model for Indo-European origins must have been speaking a very different language during the neolithic, a language which is generally and confidently denoted as 'pre-Greek'. How then can one validly speak of continuity, in the face of this self-evident transition of populations and replacement of languages?

In concluding this introduction I would like to outline an answer to that question and to indicate my reasons for thinking that this migrationist view is a misplaced one. As I have argued elsewhere (Renfrew 1987), it is much simpler and more economical to believe that the first Indo-European speakers (or Proto-Indo-European speakers) to come to Greece were simply the first farmers, whose arrival initiated the Aegean neolithic. Such a view permits a much more straightforward narrative, and allows us, among other things, to discuss in a much more direct way the vexed question of 'Who were the Greeks?'

In the first place there are grounds for caution about those migrations of new peoples with which various writers have sought to bring about the changes observed in the archaeological record. In Chapter 4 of *The Emergence* I discussed the various supposed movements in the prehistoric Aegean, about which J.L. Caskey and Emily Vermeule had written so eloquently in the preceding years. One of the preoccupations for Caskey as also for R.A. Crossland was the vexed question of 'The Coming of the Greeks', a migration which Caskey was inclined to set at the end of the Early Helladic II period, impressed as he was by the changes seen at that time at his important site of Lerna. These suggestions seemed to me implausible, and the whole migrationist approach to the question of the origin of the Indo-European languages (of which Greek is of course one) appeared unsatisfactory.

It was these dissatisfactions initially which led me to suggest (Renfrew 1973a) that the coming of Proto-Indo-European speech to Europe might be associated with the coming of farming (from Anatolia). The Greek language would then have evolved, within the lands of what is now Greece, from the starting point of that neolithic Proto-Indo-European precursor. That suggestion was not widely noticed, and I let the matter drop for a while. But following the excavations which I undertook at Phylakopi in Melos with the good fortune of discovering a Mycenaean sanctuary (Renfrew 1985) it became necessary to study the question of religious development in the Aegean. The possible religious continuities which one was tempted to suggest could well also have implications in terms of linguistic continuity. It seemed to me that there had been a series of transformations over the millennia, where each stage or phase of cult practice and belief built upon the preceding one. These transformations were profound, but there was no

reason to ascribe them to outside influences on any large scale, and still less to account for them by the arrival of new peoples. Yet when I suggested, in a seminar at Oxford, that the Aegean religions of the late bronze age were founded upon those of the early bronze age, and these upon the cult practices of the neolithic, that formidable scholar the late Professor Christopher Hawkes took me severely to task. Anyone, he said, knew that the Greek religion was an Indo-European religion—look at mighty Zeus—and so also must have been the Mycenaean religion. How, then, could it be descended from neolithic antecedents, from a period long before the time when the Indo-Europeans came to these lands?

It was at this point that I decided to tackle the Indo-European question directly. The result was my book *Archaeology and Language* (Renfrew 1987). In it I developed further the view that it was the coming of farming which brought with it Proto-Indo-European speech into Europe, from its presumed homeland in Anatolia. The matter proved controversial, and the initial formulation had several defects which I have since tried to rectify (Renfrew 1999a). The models for linguistic change which it outlined have been very widely applied; in particular the farming/language dispersal hypothesis has applications (Bellwood and Renfrew 2003) in many parts of the world. Its case for being an appropriate solution to the problem of the Indo-European languages has been significantly advanced by the chronological study of Gray and Atkinson (2003).

The possibility that Proto-Indo-European speech came to Greece (and so to the rest of Europe) from Anatolia at the beginning of the neolithic period has been greatly advanced by recent discoveries in Anatolian linguistics. For it has now been recognised that all the known languages of bronze age western and central Anatolia belong to the Indo-European family, including, of course the Hittite and Luvian languages (Finkelberg 1997). The only exception is the so-called 'Hattic' language, the apparent predecessor of the Hittite language at the Hittite capital of Boğazköy. But it is now realized that Hattic belongs to the Caucasian language family, and consequently may have originated in the Caucasus area. Contrary to previous understanding, there are now no documented languages of western Anatolia which can be shown to be non-Indo-European. There is even the possibility that the Minoan language may be derived from an early proto-Indo-European ancestor in Anatolia (Finkelberg 1997).

One obvious objection to the original proposal was the very large proportion of words in the Greek language which do not have a Greek or even a recognisably Indo-European origin. For that reason they have generally been regarded as 'pre-Greek', and their abundance has been used to support the view that the Greek language must be a relatively late arrival to the areas where it is currently spoken. Instead I have suggested (Renfrew 1998b; 1999b) that many of these lexical items are not 'pre-Greek' at all, in the sense of belonging to an earlier linguistic stratum. Instead they would represent an adstratum: relatively late additions to the vocabulary of Greece, being linguistic borrowings from Minoan Crete. Some of them—like *asaminthos*, or *labyrinthos*, as well as terms for weapons (e.g. *xiphos*) and body armour (*thorax*), as well as for musical instruments—suggest a context which is so sophisticated as to be more at home in the

palace societies of the developed bronze age. It seems very likely that many of these are in fact loan words, borrowed into Greek from the language of Minoan Crete, as an earlier generation of scholars had glimpsed (Renfrew 1998b). The notion of a much earlier, 'pre-Greek' language, spoken in Greece before the arrival of the Greeks and to be identified by these words and by the celebrated place names about which Haley and Blegen had written, now seems very dubious.

These linguistic speculations, and the evidences for continuity from the sanctuary at Phylakopi, support the view that we are indeed speaking of long-term continuities. I suggest that there never was a migratory episode on the Greek mainland which could plausibly be described as the 'Coming of the Greeks'. On the contrary, the Greeks were autochthonous! Their Proto-Indo-European predecessors spoke the language of the first farmers of the Aegean whose origins lay in Anatolia. It is worth noting that the formation of the Greek language by communities living within the present territories of Greece was earlier proposed by Chadwick (1975; see Pullen 2008), although he did not envisage their Indo-European forbears arriving as early as the first farmers.

These are important issues when we come to consider questions of identity and indeed of ethnicity in the Aegean bronze age. These complex matters become clearer only in the Classical period, when we have ample texts to document how the Greeks of the time themselves viewed ethnic questions (Hall 2000). But they are relevant also to our understanding of earlier periods (Finkelberg 2005). For one of the underlying principles of *The Emergence* is that we should not postulate incoming migrations or the formative 'diffusion' of culture unless there is strong evidence for it. Some earlier scholars attributed a powerful causative role to an alleged 'Coming of the Greeks', for which there is now no good evidence. So the possibility of continuities in religious belief, through a series of transformations, no longer has to be set aside (as Christopher Hawkes argued) on the assumption of such a 'Coming'.

This is highly relevant also when we consider the development of Greek ethnicity: of the very notion and self-awareness of 'being Greek' (Renfrew 1994; 1995). Of course language is an important component in ethnicity. As far as self-awareness of being 'Greek' goes, we find that some aspects of this reflexive view develop very late, some features as late as the Persian Wars. The foundations for Greek ethnicity do indeed go back to the Mycenaean period, and the Greek language (I suggest) was taking shape within the territories of the modern nation of Greece very much earlier, during the later neolithic period and into the early bronze age. But a full sense of being Greek and the widespread use of the term 'Hellenes' and 'Hellas' came much later.

This theme of 'Who were the Greeks?' is too large to be treated adequately here. The short answer, however, is that many features which we associate with the Greeks, including the Greek language, have origins which may be traced far back into the neolithic period. The Mycenaeans probably did not think of themselves primarily as being 'Greek' ('Hellenic'), but would reckon their affiliation instead to the small palace-centered states of the late bronze age. Indeed even in the Geometric period of Greece, with the early emergence of the city states, allegiances were to the city-state rather than to

some wider 'national' identity. That only came later and became explicit and self-conscious at the time of the Persian Wars (Renfrew 1995).

These are big questions, and deserve a more extended treatment. But they are worth mentioning here, since the events and processes of the third millennium BC, which are our primary concern, are of very great relevance to these later periods also. The foundations for the later societies of the Aegean, for the iron age as well as the later bronze age, were laid already very much earlier, in the early bronze age of the third millennium BC. To understand the entire process it is first necessary to grasp this point.

Preface (1972)

When Heinrich Schliemann discovered Troy in 1871, and then the rich princely burials in the Shaft Graves at Mycenae, with their gold drinking vessels and their ingeniously decorated weapons, he inaugurated the study of Aegean prehistory. Yet the Mycenaean civilisation which he discovered was not at first generally accepted as something distinctively European or Aegean. Many scholars felt that such rich and sophisticated objects must have been manufactured in the well-known and more advanced civilisations of the Near East and Egypt. Today the individuality of the Mycenaean, and of the Minoan civilisation of Crete, is everywhere recognised. Yet it is widely felt that these first civilisations of Europe were an offshoot of Oriental civilisation, by which they were inspired, and without which they would not have existed.

I have come to believe that this widely held diffusionist view, that Aegean civilisation was something borrowed by Europe from the Orient, is inadequate. It fails to explain what is actually seen in the archaeological record. We can no longer accept that the sole unifying theme of European prehistory was, in the words of Gordon Childe, 'the irradiation of European barbarism by Oriental civilisation'. A first objective here is to examine in detail the evidence for this view. Despite the many contacts which clearly did occur between the early Aegean and the Orient, it no longer offers a satisfactory explanation for the first emergence of civilisation in Europe.

The construction of an alternative explanation is, of course, much more difficult than the rejection of the conventional diffusionist one. A first insight was offered by work in the Cycladic islands, on the rich Early Cycladic material of the third millennium BC, which brought me to appreciate that this was the crucial, formative period for Aegean civilisation. Throughout the southern Aegean, for a thousand years, striking changes were taking place in every field—in agriculture, in craft technology, in social organisation, in art and religion, in trade, and in population. These developments evidently owed little to Oriental inspiration. Yet it was at this time that the basic features of the subsequent Minoan-Mycenaean civilisation were being determined. The present work

sets out to study in some detail these developments in the third millennium Aegean, and to explain them.

The basic approach here is naturally that of the prehistoric archaeologist. The raw material data have first to be reviewed (in Part I) before an attempt is made (in Part II) to construct from them a picture of the culture processes at work and the changes which resulted. This purely archaeological treatment of an early civilisation presents considerable problems, since the most successful analysis of prehistoric material has so far been in terms of the ecological approach, where man's adaptation to his physical environment is the principal focus of interest. This focus remains indispensable, but in its simple form it is inadequate to explain what happens when societies move beyond the subsistence economy. When many of man's most pressing concerns are now social rather than ecological, and the predominant economic problems are no longer subsistence ones, other explanations are needed, and the notion of 'adaptation' must be modified considerably. The chapters of the Introduction outline in very general terms a framework for the inquiry. They attempt to give due allowance to the specifically human problems of high-density urban living, some of which are less evident among hunting groups or early peasant societies.

This is the first time, I believe, that an attempt has been made to examine, in such detail, the emergence of one of the world's early civilisations. I have indeed included much unpublished material on the Cyclades in the third millennium, and some of this treatment may not be of interest to the general reader. Yet the validity of the approach can only be tested by its application at a detailed level to the material data available. I believe such an analysis ultimately to be more informative about the nature and origins of civilisation in general than very broad speculations and cross-cultural comparisons, which sometimes fail to recognise the considerable complexity of the process in any specific case.

To apply such aims successfully to the available material is less easy than to formulate them. The inevitable starting point must be the conclusions of earlier workers who have tackled the same problems, and here European prehistory is particularly fortunate. Several generations of notable scholars have worked to bring to light, and to set in coherent order, the evidence which is now available to us. In writing this book I have time and again found myself either emphatically agreeing with, or stimulated into constructive disagreement by, the writings of one of the most original of these, Gordon Childe. His *Social Evolution*, for instance, although not now the most widely read of his works, shows that brisk imagination and that unapologetic readiness to change his mind, which characterised all that he wrote. Between his first article in 1915, *Who Were the Minyans?*, and his *Retrospect* in 1958, he touched upon, and illuminated, most of those problems in prehistoric archaeology which trouble us today—the definition of 'culture', the Neolithic Revolution, the Urban Revolution, problems of diffusion, of archaeological taxonomy, early technology, and social evolution. The dedication of this book to his memory is an acknowledgement that his work remains one of the most active forces in prehistoric archaeology today.

Acknowledgements (1972)

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My first and greatest debt is to my teachers, notably Grahame Clark and Glyn Daniel, who taught me that it is not the material data alone but the approach to the subject which governs the hypotheses which finally we accept. It is they, and those colleagues who take pleasure in discussing the general problems of prehistoric archaeology, who have made studying the subject so rewarding.

I have incurred many obligations to friends and scholars in Greece, indeed one of the most agreeable aspects of working in the Cyclades has been the generosity and cooperation of all those archaeologists with whom I have had contact. Among those who have kindly permitted me to study unpublished material are Dr and Mrs N. Zapheiropoulos, Mr Christos Doumas, today the most active worker on problems of Cycladic prehistory, Professor N. Kontoleon, Dr S. Alexiou, Mr M. S. F. Hood and Professor J. L. Caskey, who also gave me the welcome opportunity of assisting in his excavations at Kephala in Kea. To Professor Blegen, Mr Jerome Sperling and the Director of the Ankara Museum I am grateful for access to the Kum Tepe material and for permission to publish my drawings of it. I wish also to thank Miss Sylvia Benton, Frau E. M. Fischer-Bossert, Mr Hector Catling, the late Dr C. Karousos, Professor Dora Levi, Dr G. Papathanasopoulos, Miss B. Philippaki, Mrs Patricia Preziosi, Dr David Trump and Professor Saul Weinberg for valuable advice or access to unpublished material. The late Mr R. W. Hutchinson was a kind and good friend, and an unfailing source of unexpected yet useful information.

I have had the great pleasure of cooperating with Dr J. R. Cann and Dr J. E. Dixon in the study of obsidian, and they have advised on other petrological points, as have Dr Janet Seton Springer (née Peacey) and Professors A. N. Georgiades and G. M. Paraskevopoulos in Athens. Mr J. M. Charles has been most helpful with his metallurgical knowledge.

During my stay in Greece, first as a Strathcona Student of St John's College and the School Student of the British School of Archaeology at Athens, then as holder of a Greek Government scholarship, and recently with the support of the Research Fund of the University of Sheffield, the hospitality of the School and the friendship of its members, has been generous. I have greatly benefited there from discussions with Dr Peter Warren on Cretan problems, and with Dr David French and Mr Roger Howell on the prehistory of the Greek mainland. Dr French has kindly allowed me to refer freely here to his unpublished doctoral dissertation. I am grateful to my former research supervisors Dr F. H. Stubbings and Mr A. H. S. Megaw for their counsel, and to Professor J. D. Evans for his collaboration in our joint excavations at Saliagos.

It was Dr John Coles, its General Editor, who invited me to write this book which owes much to his encouragement and to the care of Miss Janice Price. The maps have been drawn by Mr J. E. Hall, Mr C. R. Jones and Miss S. G. Ottwell, the plans by Mr N. S. Hyslop, and the diagrams by Mr H. Walkland. Mr P. R. Morley printed many of the photographs from my negatives, and for the others, or for permission to use them, I am grateful to the Managing Committee of the British School of Archaeology at Athens (as for permission to publish my drawings of Cycladic material), the Trustees of the British Museum, the Director of the National Museum in Athens, the Keepers of the Departments of Antiquities of the Ashmolean Museum, of the Musée du Louvre, and of the Nationalmuseet in Copenhagen, to the Director of the German Archaeological Institute in Athens, to Mr M. S. F. Hood, Professor J. L. Caskey, Professor N. Kontoleon, Mrs Dolly Goulandris and especially to Dr and Mrs N. Zapheiropoulos and Mr Christos Doumas. The frontispiece is the work of Ino Ioannidou and Lenio Bartziotis, with the kind permission of Mrs Goulandris.

My wife has been a constant source of encouragement, spiritual and practical, throughout the preparation of this work. Inevitably we have found working in the Cyclades the most personally enjoyable part of this research. Mr M. Bardanis, Mr Z. Vaos, Mr N. Gavalas, Mr V. Kaloudas, Mr G. Kastrisios and the museum officials in the Cyclades have been very helpful. To all these colleagues, to those friends in the islands who have been so very hospitable, and especially to the friendly people of Apeiranthos, my very grateful thanks.

July 1970
Sheffield

Introduction

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In this sense, it is perfectly logical that the Aztecs, for instance, should be regarded as uncivilised in view of their practice of human sacrifice. Equally we might so qualify the Greeks because they exposed unwanted babies to die. But these are value judge-

ments, and 'civilised' in this sense can only mean conforming to our own standards of morality and conduct. For the anthropologist the definition is too subjective to be useful.

The archaeologist makes a valuable distinction between culture, a general attribute of man, and cultures, each a *specific* adaptation of a human group to the particular problems of its environment. Culture, in the generalised sense, has been well defined (White 1959, 8) as 'man's extra-somatic means of adaptation'. More than anything else it distinguishes man from other animals, being learnt and not inherited as part of one's genetic composition. A culture on the other hand (and note the indefinite article), designates a specific human adaptation at a given time and place. The archaeologist gives the term a special meaning (Childe 1929, vi): 'a consistently recurring assemblage of artefacts'. This definition is particularly convenient, couched as it is in operational terms relating to what the archaeologist actually finds. It assumes that the different specific adaptations may be recognised and distinguished by means of the different artefacts which the members of the group habitually used.

Just as a distinction can be made between culture and cultures, the latter being localised in time and space, so we can distinguish between civilisation and civilisations. Civilisation is a stage, level or state of cultural development, and the main purpose of this chapter is to characterise it more clearly. Anticipating that definition for a moment, and assuming that it can be formulated, we can be specific about civilisations. A civilisation (and the indefinite article implies the possibility of specifying its geographical and chronological position) is a culture of a particular kind. A civilisation is then, in the operational language of the archaeologist, 'a constantly recurring assemblage of artefacts'—of a particular kind. Underlying the operational definition, again, is the notion of a group of people sharing a unique way of life, a unique adaptation.

The craft specialisation and social stratification which we shall find to be features of all civilisations imply that, strictly speaking, there is no single recurrent assemblage, but several interrelated assemblages of artefacts (as indeed is often the case for cultures in general). But otherwise a civilisation resembles a culture in requiring spatial and temporal definition. The Sumerian civilisation, for instance, is defined by the distribution of artefact assemblages predominantly and specifically of Sumerian type. And the definition can be extended to cope with traded products, or with discontinuities, like that documented by the Assyrian trading colony at Kültepe, many miles from the continuous distributions of the Mesopotamian homeland.

It is more difficult to specify the temporal boundaries than the geographical ones the decision is an arbitrary one, although in rare cases the end may be sudden. But no new civilisation ever had a sudden beginning or 'birth'.

Any distinguishable culture whose institutions and material achievements fulfil the defining criteria which we choose to adopt is properly termed a civilisation. We can thus speak of the Sumerian civilisation, the Indus civilisation, the Maya civilisation and so forth. But always the precise definition employed is based upon criteria which are essentially arbitrary: the Minoan civilisation and the Mycenaean civilisation can be re-

defined so as jointly to constitute the Minoan-Mycenaean civilisation; the Olmec, Maya and Aztec civilisations can be lumped together as Mesoamerican; in the same way the classical world can be divided into 'Greece' (until the second or first century BC) and then 'Rome'. It remains to decide what distinguishes this state or form of culture known as civilisation from other states or kinds of culture. Various criteria have at times been put forward, and some of these will now be considered.

In his book *Man Makes Himself*, Gordon Childe elaborated his notion of an 'urban revolution' by which civilisation was created in the Near East: this was a pioneering attempt to explain the process in detail. For Childe, a key feature was the formation of the *city*, the beginning of urban life—as indeed it has been for most thinkers and historians from the time of Sophocles to the present. 'In the Near East the Bronze Age is characterised by populous cities wherein secondary industries and foreign trade are conducted on a considerable scale. A regular army of craftsmen, merchants, transport workers, and also officials, clerks, soldiers and priests is supported by the surplus food-stuffs produced by cultivators, herdsman and hunters. The cities are incomparably larger and more populous than neolithic villages. A second revolution has occurred, and once more it has resulted in a multiplication of our species' (Childe 1936a, 37).

For Lewis Mumford too, the essential feature of civilisation is the city, the 'container' as he graphically terms it, for all the new activities of civilised life. For him the urban revolution was 'the implosion of many diverse and conflicting forces in a new kind of container, the nucleated city'. 'The city is the means of transforming power and productivity into culture and translating culture itself into detachable symbolic forms that can be stored and transmitted' (Mumford 1960, 338). Yet there is no one-to-one correspondence between civilisation and cities. Several authors have emphasised (Coe 1962, 66) 'that: there is now excellent evidence that many early cultures which possessed all the other criteria of civilisation seem to have been non-urban. Among them are the Maya, Khmer, Mycenaean and pre-eighteenth Dynasty Egyptian civilisations'. The great temples of the Maya, the elaborate calendar, and the monumental sculpture, which testify to an elaborate religion and very developed technology, were not accompanied by a particularly high population density or by recognisable urban units. It would seem difficult to deny to Tikal, the great Mayan ceremonial centre, the appellation 'civilised', or indeed to Angkor Wat. Yet Tikal contrasts markedly with the huge early city of Teotihuacan, likewise in Mexico. The central area alone of Teotihuacan exceeded in size the entire agglomeration of buildings at Tikal, and Teotihuacan unlike Tikal was the seat of a very large population (see fig. 1.1).

Although the densely populated city is the most obvious symptom of civilisation, it is not an essential component. On the other hand, probably no civilisation lacks the monumental public buildings—whether granaries, palaces or temples—which seem indeed to be present in every community which one would wish to term civilised.

The presence of *writing* is another key feature, whose importance has frequently been underlined (cf. Gelb 1960). But several cultures upon which it seems appropriate to bestow the term civilised, such as that of the Incas of Peru, had no effective form of

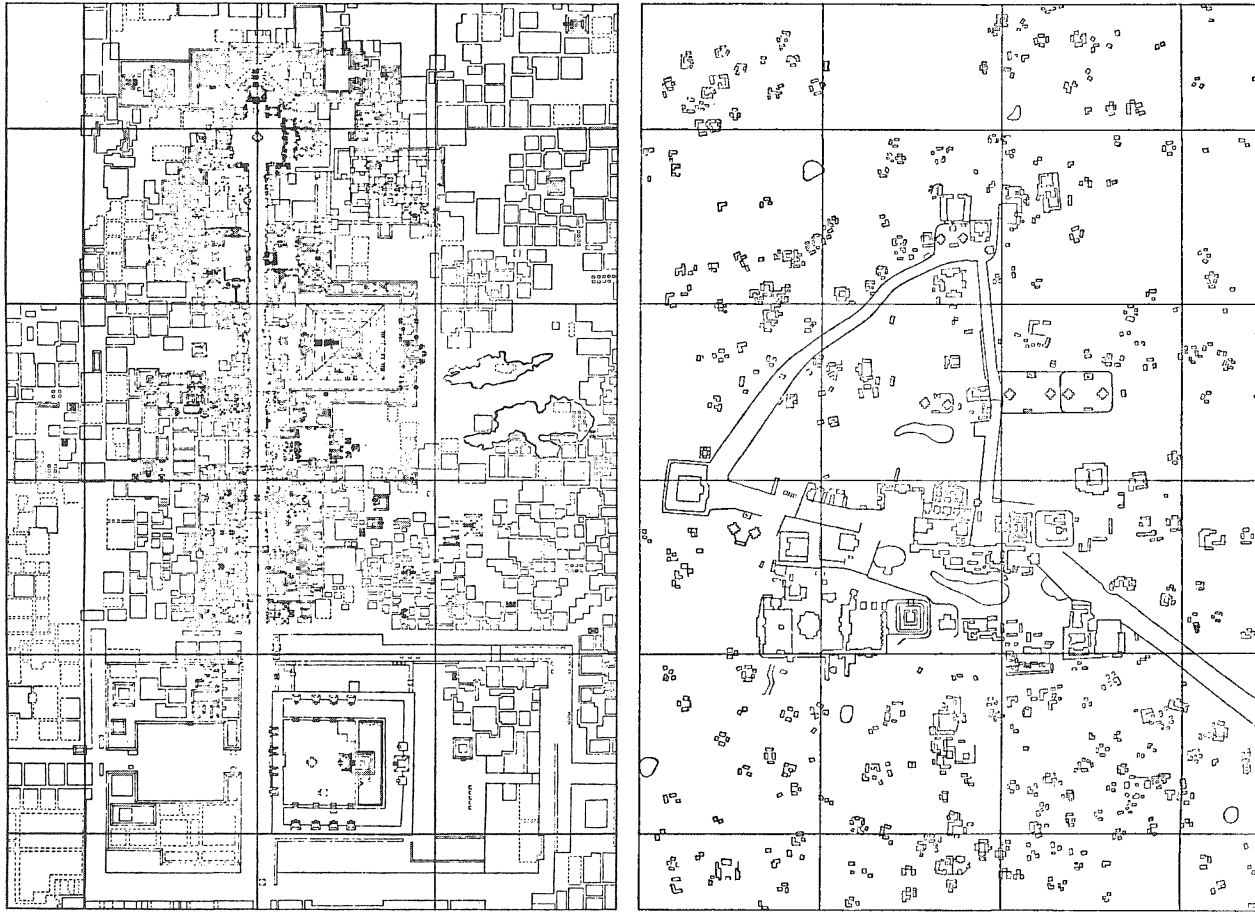


FIG. 1.1 The contrasting density of settlement at Teotihuacan (*left*) and Tikal (*right*) in Mesoamerica. Tikal is the largest of the lowland Maya ceremonial centres, yet scarcely ranks as a city in terms of population or density of settlement. Both sites are shown at the same scale (squares of side 500 m) (*after Millon*).

writing. And indeed the glyphs of the Olmecs and Mayas seem to have been employed principally for calendrical notations.

The central significance of a *state religion* has often been stressed, but this again is hardly a satisfactory universal criterion. No temples are yet known in the Indus civilisation for instance, and the little shrines of Crete and Mycenae are not greatly impressive. On the other hand, the massive monumental temples of Malta belonged to a culture which had few other advanced features.

Social organisation and *craft specialisation* are features emphasised by nearly all historians of early culture. As Robert Adams has written (1966, 12): 'I also believe that the available evidence supports the conclusion that the transformation at the core of the Urban Revolution lay in the realm of social organisation; ... in the case of complex state societies, their rise is accompanied by the progressive dissociation of major institutional spheres from one another.' It does indeed seem that all civilised societies have a well-defined social organisation, where craft specialisation is generally also seen. But it is, on the other hand, not easy to formulate universal criteria by which these features may be recognised from the archaeological record.

It appears then that no single feature or symptom of civilisation, which can be singled out and sought for in the archaeological record, can be used as the overriding and defining criterion.

Indeed, when seeking an operational, working definition, it seems preferable to take a polythetic criterion—that is to say one that is based on the presence of a certain number, but not necessarily of all, of a series of defining features. Gordon Childe listed ten such features which distinguish the earliest cities from villages (Childe 1950b), yet it was Clyde Kluckhohn (1960, 400) who first formulated a definition in explicitly polythetic terms:

'City dweller' and 'urban' loosely designate societies characterised by at least two of the following features:

- (i) towns of upward of, say, 5,000 inhabitants
- (ii) a written language
- (iii) monumental ceremonial centres.

If we are to formulate such an operational definition, with criteria which are inevitably somewhat arbitrary, this seems a very acceptable one. It embraces all those early cultures which are usually designated civilisations. And it excludes societies with only a single astonishing feature, like Stonehenge, or the temples of Malta, or indeed the Tărtăria tablets of Romania.

One would wish to go further, however, and seek a statement of something more central to the idea of civilisation than a mere choice of its symptoms. As Adams has observed (1960, 291): 'In addition it is of course implicit in this discussion that the common social institutions and processes of development identified in each of the four civilisations were bound up together with this general constellation of subsistence prac-

tices in a functionally interacting network which characterises early civilisations as a sort of culture type.’

Henri Frankfort likewise felt the need to grasp at a single, more central idea, and wished to define: ‘the individuality of a civilisation, its recognisable character, its identity which is maintained through the successive stages of its existence. . . . We recognise in it a certain coherence among its various manifestations, a certain consistency in its orientation, a certain cultural “style” which shapes its political and its judicial institutions as well as its morals. I propose to call this elusive identity of civilisation its “form”. It is the form which is never destroyed, although it changes in course of time’ (Frankfort 1951, 16).

The use of a term such as ‘form’, itself not adequately defined, can never be very meaningful. Yet Kluckhohn’s general definition, while capable of objective and rigorous application, is hardly a satisfying one either. Surely, one feels, there must be some central, core idea, some unifying concept to make our definition of civilisation something more than a polythetic bundle of apparently ill-assorted culture traits.

In the next section such a concept is outlined. As a definition it is certainly not as rigorous as Kluckhohn’s, which remains perhaps the most convenient for practical, operational use. Yet it does, I would claim, give a more satisfactory general statement of what we mean by civilisation, and of what different civilisations hold in common. For this reason it may be more useful when we are considering the origin of the Minoan/Mycenaean civilisation.

Man’s multi-dimensional environment

Many of man’s activities are conditioned by his cultural environment, and satisfied by certain interrelations with it. The term ‘environment’ here is not intended as a metaphor: when man comes into the world he rapidly comes into contact with things, people and ideas outside himself. If a man lives among people, these are part of his environment as much as the local geology, or plant life, or the weather. If he lives in a house, this is part of his environment. If he is taught a religion, this too is part of his environment, since his behaviour and activities are conditioned by the forces which he believes act upon him rather than by those which the sceptic may recognise.

To some extent these different aspects of the environment may be regarded as independent. A man’s social actions do not necessarily impinge directly on his quest for food, nor his religious beliefs and activities on the interior design of his home. Ultimately, as the functionalists would hold, there may be a relationship, but these different fields of activity can be distinguished. In this sense man’s environment is multi-dimensional and, consequently, his culture—his adaptation to his environment—is multi-dimensional too. As Lewis Binford has put it, ‘Archaeologists ... are measuring along several dimensions simultaneously, ... culture is neither simple nor additive’ (Binford 1968a, 24).

To say that culture is multi-dimensional does not of course mean that the dimensions are precisely analogous to the three spatial and one temporal dimension with which we describe space-time, and the definition of these dimensions will always perhaps be an arbitrary one—a situation which will not dismay the mathematician who is used to transforming his variables or rotating his sets of variables.

The environment to which a man is born is not static—it is dependent on the religion and social beliefs and customs, the technology, mores and language of his society, that is to say on its culture, as well as on nature. And this environment is itself largely the product of human actions, over a long period of time, themselves shaped by the heritage of customs and tradition of the society. It is, indeed, an artefact—or rather a complex amalgam of many artefacts, as well as of natural objects and processes. Language, of course, is an artefact, although not a material one, and not the product of a single craftsman. But its form is uniquely determined by human action and convention just as much as that of a Sumerian temple or a British teapot. Religion (seen from the standpoint of an anthropologist rather than of a believer) is an artefact in the same way, as are all explicit theories about the world. Once again, this is not a metaphor—these things are made by man.

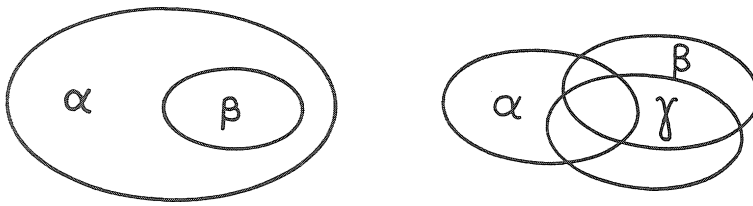


FIG. 1.2 The activities of man (β) when he is viewed simply as one component of the ecosystem (α).

FIG. 1.3 An anthropocentric view of the activities of a man (β). Some of his activities interact directly with the ecosystem, and are still activities of the ecosystem (α). The activities of other men are represented by the field γ , and the overlap between β and γ represents the field of this man's social activity.

Imitating the topological psychologists, we can compare the developing environment of a culture with the changing environment of life-space of a child. Fig. 1.4 from Kurt Lewin's *Field Theory in Social Science* (1952, 136), illustrates graphically how certain 'areas' of existence are open to a child, others to an adult: the 'life-space' is different. Geographers today, in the same way, use the concept of perceptual space. We can apply this image directly to man's environment. Let the unshaded area in fig. 1.4, a be the natural world accessible to an Upper Palaeolithic hunter. And let the unshaded area in fig. 1.4, b be the natural world accessible to an Early Dynastic Sumerian. Nos. 2, 3, 4 and 6 represent the areas accessible to both (wild plant and animal resources, flint for chipped stone etc.). Areas 7 to 23 designate fields of activity always potentially open to the hunter, such as cereal plants, copper and resources overseas. But these elements

of the world only become effectively part of man's environment after the domestication (or at least intensive exploitation) of the plants and animals, the discovery of the smelting of copper ore and the construction of boats. Man's environment has then been greatly enlarged, and the increase has been the result of cultural acquisitions, of the production of what are in the broader sense new artefacts. Boats, for example, are artefacts, as is smelted copper and, indeed, the technical skills required for its smelting. In a meaningful sense, so too are domestic plants and animals, since the most satisfactory criterion of domestication is controlled breeding. An artefact can, in the same way, be

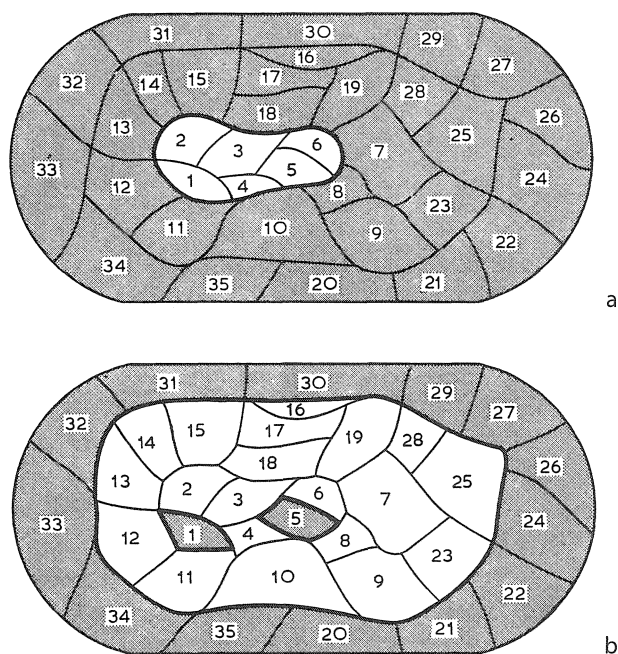


FIG. 1.4 'Comparison of the *space of free movement* of child and adult. The actual activity regions are represented. The accessible regions are blank; the inaccessible shaded. (a) The space of free movement of the *child* includes the regions 1–6, representing activities such as getting into the movies at children's rates, belonging to a boy's club, etc. The regions 7–35 are not accessible, representing activities such as driving a car, writing cheques for purchases, political activities, performance of adults' occupations, etc. (b) The *adult* space of free movement is considerably wider, although it too is bounded by regions of activities inaccessible to the adult, such as shooting his enemy or entering activities beyond his social or intellectual capacity (represented by regions including 29–35). Some of the regions accessible to the child are not accessible to the adult, for instance, getting into the movies at children's rates, or doing things socially taboo for an adult which are permitted to the child (represented by regions 1 and 5).'

The developing environment or life-space of a human culture may be compared with the changing life-space of a child, as viewed by the topological psychologist. As the culture evolves new adaptive means of exploring and using the environment, this environment is effectively enlarged. Yet the loss of specialist skills—of the hunter, for instance—may effectively close off regions of the environment which were formerly open (after Lewin).

the work of many generations, and can be formed without any prior and deliberate plan, the accretion of the efforts of many different periods. Many medieval cathedrals are artefacts of this kind.

Certain areas in the environment of the hunter may no longer be accessible to civilised man: 1 and 6 may be taken to refer to skills in collecting certain animals and plants, or craftsmanship in chipped stone which may have been lost between the Upper Palaeolithic and the Early Dynastic period, effectively closing off parts of the potential environment. This image of the life-space of man can be extended into the other dimensions of the environment, referring to the whole field of social activities as well as activities relating to the natural component of the environment. It takes little reflection to see how many new social and religious relationships, for instance, become possible in a more 'advanced' society; the environment is enlarged in several dimensions.

It is now possible" to make a statement about civilisations which does not seek to define them in terms of a single principal culture trait, or even polythetically, in terms of, for example, two out of three traits. Nor does it appeal to 'form' or 'culture style'. We can see the process of the growth of a civilisation as the gradual creation by man of a larger and more complex environment, not only in the natural field through increasing exploitation of a wider range of resources of the ecosystem, but also in the social and spiritual fields. And, whereas the savage hunter lives in an environment not so different in many ways from that of other animals, although enlarged already by the use of language and of a whole range of other artefacts in the culture, civilised man lives in an environment very much of his own creation. Civilisation, in this sense, is the self-made

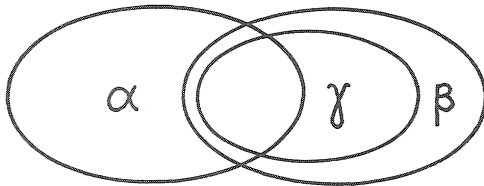


FIG. 1.5 The effective insulation of man from nature by means of the artefacts which he creates. His activities (β) are largely related to artefacts (γ), and his contacts with nature (α) nearly always involve their mediation.

environment of man, which he has fashioned to insulate himself from the primaeval environment of nature alone. All the artefacts which he uses serve as intermediaries between himself and this natural environment and, in creating civilisation, he spins, so to speak, a web of culture so complex and so dense that most of his activities now relate to this artificial environment rather than directly to the fundamentally natural one.

If we consider life in a Minoan palace, for instance, the material dimension of the environment represents a considerable enlargement on that of the neolithic villager, although in both the man-made environment mediates to some extent between man and nature. In the palace, for instance, there was running water, drainage, toilets even, and provision for light and heat (fig. 21.3). The decoration and art were the product of skill and the subject of admiration, and this represents a new man-artefact relationship, an enlargement of the environment.

The throne room at Knossos is the symbol of the enlarged social environment of each member of society, where social stratification and craft specialisation introduced new relationships between men. The Sumerian religion (which is better understood than the Minoan) substituted an explicit cosmology, rationalising the world by its objectifications, and allowing man to participate in efficient maintenance of the world order. Such a religion is a projection by man, an artefact, which mediates (or is believed to mediate, which in this context is the same thing) between himself and the observed realities of nature.

Writing itself, man's subtlest artefact, not only permits new kinds of communication from man to man (and, hence, new relationships). In a temple or palace economy it allows new man-artefact relations: the store of products (artefacts) and foodstuffs (many of them also in a sense artefacts) can now take place on a more systematic basis. When used for calendrical purposes, writing permits predictive astronomy, and thus again is artefact mediating between man and nature.

A developed art style is also an improved form of communication: like writing it transmits information symbolically. And, as in writing, the symbol does not have to be representationally complete. The colossal statue of an Egyptian Pharaoh with his emblems of kingship is, by virtue of its convention, intelligible to all members of Egyptian civilisation as a statement about the social order (as well as the religious order). The symbolism of power and kingship is part of the human environment in all highly ordered societies. The development of these coherent systems which we may term projective or symbolic,—writing, a coherent art style, and a framework of religious beliefs—is something seen already, to a considerable extent, in all human societies, and in a much more developed form in all civilisations. As Ernst Cassirer has observed, 'the functional circle of man is not only quantitatively enlarged; it has also undergone a qualitative change. Man has, as it were, discovered a new method of adapting himself to his environment. Between the receptor system and the effector system, which are to be found in all animal species, we find in man a third link which we may describe as the *symbolic system*. This new acquisition transforms the whole of human life. As compared with the other animals man lives not merely in a broader reality; he lives, so to speak, in a new *dimension* of reality' (1944, 24).

Here then is the created environment of man which, in a civilisation, takes on a new complexity. Not only is there a whole new range of material artefacts but these various symbolic artefacts of which Cassirer has written, the artefacts of the projective systems, also find expression in material form. It is now that we see a written language; it is now that we see temples as visual symbols of man's religious beliefs, and palaces as a concrete expression of his social order. Robert Redfield, in his admirable book *The Primitive World and its Transformations*, likewise stressed the importance of the nonmaterial aspects of culture and described the progress from what he termed 'the primary condition of mankind' to civilisation as a series of 'great transformations'. 'The great transformations of humanity are only in part reported in terms of the revolutions in technology with resulting increase in the number of people living together. There

have also occurred changes in the thinking and valuing of men which may also be called “radical and indeed revolutionary innovations”. Like changes in the technical order these changes in the intellectual and moral habits of men become themselves generative of far-reaching changes in the nature of human living’ (1953, 24).

Civilisation can be compared to a space rocket: the men within it are to a large extent encapsulated, insulated from direct contact with nature. The problems of securing food and shelter, although they are present, are now eclipsed by other preoccupations which could not exist outside of this civilisation.

Of course not every participant of a civilisation is insulated so effectively as the Minoan prince in his palace. The large proportion of agricultural workers have a life in many ways similar to those of a neolithic community or to a modern ‘folk’ society. But the existence of the palace or the city, and the social and religious contacts which these people have with it, make them members of civilisation and enlarge their environment just as the environment of all men is enlarged by the first man to set foot upon the moon.

In an attempt to match the concision of Leslie White’s definition of culture as ‘man’s extra-somatic means of adaptation’ this position may be summarised: Civilisation is the complex artificial environment of man; it is the insulation created by man, an artefact which mediates between himself and the world of nature. Since man’s environment is multi-dimensional so too is civilisation.

This definition is, of course, not an operational one: defining criteria such as Kluckhohn’s have to be chosen. It may thus be entirely satisfactory to say ‘civilisation is a constantly recurring assemblage of artefacts including two out of three of the following: written records, ceremonial centres, cities of at least 5,000 inhabitants’, but this is only an operationally effective way of saying ‘a civilisation is a constantly recurring assemblage of artefacts documenting a human environment effectively insulating the individual from the world of nature’. It seems logical to select as criteria the three most powerful insulators, namely ceremonial centres (insulators against the unknown), writing (an insulator against time), and the city (the great container, spatially defined, the insulator against the outside).

This definition expresses what all these various and agreed defining features—writing, cities and so forth—have in common. It makes clear why these are important criteria, where metal-working, for instance, although not irrelevant, is something of a technological detail. We see, too, how the celebrants in a Maya temple were much more thoroughly encapsulated in an environment of their own construction than the sun-watchers of Stonehenge. Both, of course, were far from the palaeolithic cave-painter who, for a brief moment, created a world of his own before emerging into the harsher reality of day.

A man born into the world is shaped by his environment. We may say that civilisation, like language, ‘far from being simply a technique of communication, is itself a way of directing the perception of its speakers and it provides for them habitual moulds which analyse experience into significant categories’ (cf. Dobzhansky 1962, 71). Culture

has been regarded as 'patterned behaviour', but with the behaviour patterns which he learns the civilised man or child inherits a ready-made world-view: we are all children of our time. And yet, on the other hand, civilisation and this world view are made by man. The situation is like the old parable, 'Which came first, the chicken or the egg?', which has a structure analogous to 'The child is father of the man'. In the case of a civilisation the situation is continuous; both man and civilisation coexist and they influence each other mutually. There is 'feedback'. As we shall see in the next chapter, the feedback is positive. As Sapir put it, again speaking of language: 'the instrument refines the product, the product refines the instrument' (Dobzhansky 1962, 210). That is what Gordon Childe understood so well when he called his study of the origins of civilisation *Man makes Himself*.

The Explanation of Culture Change

LOUIS MORDELL

Anticipating for a moment this first conclusion, we can see at once that it poses more problems than it solves. If the existing account of Aegean developments is rejected, just how are we to explain the major changes that occurred? This is the central problem which has first to be faced, and it is treated here in very general terms, applicable equally to other civilisations at other times. A rough explanatory framework can be constructed to facilitate the survey, undertaken in Part II of this book after the presentation of the basic material in Part I.

Culture change and the growth of civilisation has been explained at different times in a wide variety of ways. The pattern of history is seen as the will of God ('God is working his purpose out, as year succeeds to year: God is working his purpose out and the time is drawing near'). Or it is the expression of man's genius ('We in the ages lying, in the buried dust of the earth, built Nineveh with our sighing, and Babel itself with our

mirth.... We are the music-makers, and we are the makers of dreams'). Or again it is the product of the operation of laws of culture process. In the words of Auguste Comte (1875, 427), 'this sociological recognition of laws perfects the concept of law in all other provinces.... The sense of the presence of invariable laws, which first arose in the mathematical province, is fully matured and developed in high philosophical speculation by which it is carried on to universality.'

Archaeology, and hence prehistory, certainly differs from history in declining to explain the past in terms of the thoughts of its actors. The refusal seems inevitable, since the actors of prehistory are not individually identifiable. The material nature of the data of archaeology at first indeed suggests an exact analogy with the natural sciences, as Comte suggested, and the notion today attracts some archaeologists who, dissatisfied with the explanations so often given in archaeology, seek to make statements of a higher generality. The highest goal is sometimes set as the discovery of the 'laws of culture process' (Binford 1968a). Archaeology has, however, so far failed to formulate universal laws, and it seems unlikely that it will be able to do so. It seems at present doubtful whether the framework appropriate to the explanation of change in human culture will show a structure precisely the same as the hypothetico-deductive framework regarded by philosophers of science as sustaining the procedures of the physical sciences. Sir Karl Popper (1957, 120 f) has very cogently dismissed the notion of 'law' in history (and by implication, in prehistory), and until these persuasive objections can be overcome the implication that all archaeological explanations need aspire to the status of laws of culture process is difficult to accept.

Where the 'culture process' approach does advance our understanding considerably is by insisting that cultures (or civilisations) cannot be regarded as indivisible units. As Lewis Binford (1965, 203) has put it, "The normative theory of culture, widely held among archaeologists, is inadequate for the generation of fruitful explanatory hypotheses of cultural process. One obvious shortcoming of this theoretical position has been the development of archaeological systematics that have obviated any possibility of measuring multivariate phenomena and permit only the measurement of unspecified "cultural differences and similarities" as if these were univariate phenomena.' The alternative is to lay emphasis rather on the different factors, or dimensions, or subsystems, of the culture (the terminology depending on the precise model which is being used) and the manner in which they interact, resulting in a change in the culture. By stressing the interrelationship of factors this approach avoids singling out one single aspect—climate, population, religion or whatever—as uniquely significant.

A consideration of culture process demands more than a simple narrative of events. For instance the statement that a pronounced change in the material culture of an area was preceded by a migration to it does not adequately explain the change (Binford 1968c, 267 f). Some more detailed analysis is needed to indicate the way in which the migration acted upon the existing society and its existing cultures. To speak of 'culture influence' resulting in 'modification of the culture' is vague: the same mode of thought leads to talk about the diffusion of culture 'traits' or the 'influence' of the German dag-

gers, for instance, on the daggers of the British early bronze age as if these mere artefacts were living beings, each with a will of its own. But as Professor Hawkes rightly commented, 'Battle axes don't fly', and to invest the artefacts or the culture itself with human attributes can be dangerous. Although we define a culture operationally as a 'constantly recurring assemblage of artefacts' its explanation cannot be restricted to the artefacts themselves.

While the simple narration of a sequence of events is not an explanation, it is a necessary preliminary. We are not obliged to reject Croce's statement (quoted Collingwood 1946, 192): 'History has only one duty: to narrate facts', but simply to find it insufficient. The first, preliminary goal of an archaeological study must be to define the culture in question both in space and time. Only when the culture has been identified, defined and described is there any hope of 'taking it apart' to try to reach some understanding of how it came to have its own particular form. But the interest with space-time systematics is never an end in itself: as Sir Mortimer Wheeler put it (1954, 215), 'We have been preparing timetables, let us now have some trains.'

An explanation for change in prehistory seeks to give a deeper insight into prehistoric cultures than the simple narration of a culture sequence. On the other hand, we have expressed doubt as to whether it can aspire to the form of universal law seen in the natural sciences. Between the existence of historical narrative and scientific law lies the possibility of explaining *how* certain events came about by *linking* them to previous events and circumstances. To establish causal chains requires more than listing events: the continuity between them has to be established, and this does seem to require the formulation of meaningful generalisations which, while lacking the universality to which Popper rightly objects, do have some predictive power. The precise nature of such generalisations remains a crucial problem in archaeological and historical theory. Yet without claiming to solve this problem, one can at least begin to see a way around it. Changes in culture can meaningfully be explained in terms of the continuous operation off actors within the culture, which are continually inter-acting (Flannery 1967a, 119). This lies at the kernel of the notion of 'culture process'.

The explanation then involves the choice of a mechanism, a notion of how these factors interact. It implies a view of the past, a framework into which to fit one's ideas, in short a model (Renfrew 1968c). The framework or analogue model which will be adopted here is that of a culture viewed as a system.

The potential value of the systems approach as applied to human culture is enhanced by the rigour which the growth of cybernetics has brought to it. Norbert Wiener himself applied to human societies a basic concept of systems theory, that of homeostatic processes (1948, 187): 'Small, closely-knit communities have a very considerable measure of homeostasis: and this whether they are highly literate communities in a civilised country, or villages of primitive savages. Strange and even repugnant as the customs of many barbarians may seem to us, they generally have a very definite homeostatic value which it is part of the function of anthropologists to interpret.'

Various properties of systems are very relevant to the study of cultures: systems as models have been discussed by Ashby (1956, 109). He makes the important observation that systems have 'emergent' properties when they are very large (as in the case of a culture) or when our knowledge of the behaviour of their components is otherwise incomplete. The essential point here is that a system, in the precise cybernetic sense, makes a particularly good description of, or model for, a human culture.

Systems behaviour has been extensively used also in considering the economic behaviour of societies, and it is particularly interesting that the early application here was independent of the development of electronics and cybernetics in relation to information theory, but arose through Tustin's application of control-system engineering (Tustin 1953).

With so many evident possibilities it is perhaps surprising that not until 1965 was an equation made between cultures and systems, in this sense. Lewis Binford (1965, 203) then 'proposed that a culture be viewed as a system composed of sub-systems ... differences and similarities between the different classes of archaeological remains reflect different sub-systems and, hence, may be expected to vary independently of each other in the normal operation of the system during change in the system.... In cultural systems, people, things and places are components in a field that consists of environmental sub-systems, and the locus of cultural process is in the dynamic articulations of these sub-systems.' To refer to culture systems, therefore, becomes more than a vague figure of speech: it indicates the use of a model, which, because of its great generality and flexibility, promises to be very valuable. David Clarke has usefully listed a number of properties of certain kinds of systems which can be applied to cultures (Clarke 1968, 75 f, 224 and 275).

Both Binford and Clarke, however, like Wiener before them, have simply indicated the possible usefulness of applying this model to archaeological cultures, without actually doing so. Kent Flannery was apparently the first to do this in his paper 'Archaeological systems theory and early Mesoamerica' (1968, 67). Very lucidly, and with the avoidance of unnecessary jargon, he analysed five food procurement systems in terms of two regulating mechanisms, seasonality and scheduling. And he examined six procurement systems in terms of positive feedback.

So far, such concepts have not explicitly been applied, or at any rate not in detail, to the origins of civilisation. Although the application presents difficulties, it seems to be worth trying. For, in the first place, it sets up a coherent model for society and for the interaction of its parts, which is much broader in its scope than an approach which begins and ends simply with artefacts and refuses to look beyond them, or which remains preoccupied with the complexities of space-time systematics. Human societies can only be understood in terms of human situations, even if all our knowledge about prehistoric ones has to come from artefacts, and all inferences about them have to be tested against the material record. Secondly the explanations to which this approach gives rise are hypotheses, which have specific implications, and which can be tested and in some cases refuted. The systems approach allows one to view specific situations in space and

time as the outcome of complex interactions which operate continuously. To say this need not imply any rigorous or prescriptive determinism.

Cultures as systems

Operationally defined, a culture is a constantly recurring assemblage of artefacts. To represent the culture as a system or as part of a system, it is useful to consider not only the preserved artefacts, but the members of the society that produced them, the natural environment they inhabited and the other artefacts (including the nonmaterial ones such as language and projective systems) which they made or used. Obviously we cannot have detailed knowledge of all these for prehistoric societies, but it is proposed that we assume they existed. The artefacts available today, which we will take to be of known provenance and approximately known date, are the material remnant of this system.

The components of the system are not only the members of the society but the artefacts which they have made or which they used (including the nonmaterial ones) and all objects in nature with which they come into contact. 'Anything that consists of parts connected together will be called a system' (Beer 1959, 8). What connects the components of this particular (and very large) system are the actions between these three classes of individual: man, artefact, natural object. As Katz and Kahn (1966,94) have written: 'The problem of structure, or the relatedness of parts, can be observed directly in some physical arrangement of things where the larger unit is physically bounded and

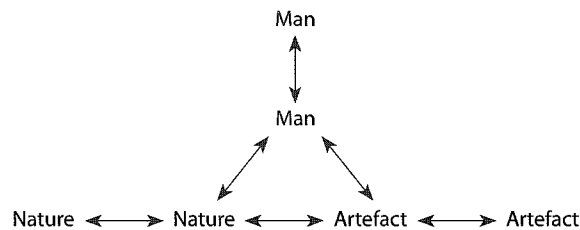


FIG. 2.1 Six kinds of interaction, five of them within the culture system, and one (Nature/Nature) outside it.

its sub-parts are also bounded within the larger structures. But how do we deal with social structures where physical boundaries in this sense do not exist? ... The structure is to be found in an interrelated set of events. It is events rather than things which are structured, so that social structure is a dynamic rather than a static concept.'

The dichotomy here established between man and nature does not support in any sense the view that man is not just an integral part of the natural world, inextricably bound with it. Indeed the whole purpose of utilising the systems approach is to emphasise man-environment interrelations, while at the same time admitting that many fun-

damental changes in man's environment are produced by man himself. They emerge, that is to say, from technological and social changes rather than simply from ecological ones.

Artefact–artefact interactions can come about without the direct presence of man: when the new wine cracks the old bottle, or when the domesticated cow eats the domesticated wheat. Nature–nature relationships (referring to natural phenomena) are relevant too: the cow needs grass, the fisherman fish and both the grass and the fish may be beyond the field of man and his artefacts. The overall system which we have to consider, therefore, is larger than man's culture, in that it includes both his environment and man himself.

It is important to realise that the choice of elements which constitute the system is ours. We are free to define the interacting elements which constitute the system. When there are other elements not defined as part of a system, which interact with it, then the system can be said to have input and output: it is an open system.

There are two important points to consider: the boundaries of the system, and the nature of the connections within the system. First, it should be noted, a system can be simplified and portrayed in a new form when its states are compounded suitably: 'Were the engineer to treat bridge-building by consideration of every atom, he would find the task impossible by its very size. He therefore ignores the fact that his girders and blocks are really composite, made of atoms, and treats them as his units.... It will be seen, therefore, that the method of studying very large systems by studying only carefully selected aspects of them is simply what is always done in practice' (Ashby 1956, 107). It would be possible, therefore, to consider the atomic and molecular structure of the objects and artefacts, regarding each as a system in itself. Equally the humans participating can each be regarded as a system. For the present purpose, however, these natural objects, artefacts and people are our components.

Just as it is convenient to ignore individual atoms and generalise on a higher level, so it can be convenient to lump together these components, and speak of larger units. When these larger units themselves are structured we may designate them as subsystems.

In order to establish the nature of the boundary of the culture, the man–environment system of the given culture can be described in terms of the individual settlement units as distributed in space. No settlement in the Old World is completely isolated from any other: we can imagine the situation, say 5,000 years ago, when each village had at least some contact with its immediate neighbours, they with their neighbours, and so on, creating a great lattice across the whole of Europe and indeed Asia, and only stopping perhaps at the Pacific and Atlantic Oceans. 'No man is an island unto himself, each is a peninsula, a part of the Main.'

In deciding on the spatial boundaries of our system we are thus 'making a somewhat arbitrary decision—as we are entitled to do. As archaeologists we follow the record of the artefacts as discussed in the last chapter. The archaeologist considers the distribution of artefact types, and sets the boundaries of the archaeological culture according

to convenient criteria. We follow these, and indeed assume that the uniformity within the culture area is due to the contacts and inter-connections described. The greater difference with the outside region is generally assumed to be due to diminished contacts and interrelations.

For different purposes we shall draw the boundaries differently: at one moment we may wish to consider the Minoan civilisation, perhaps in the seventeenth century BC; and will draw the boundaries accordingly, at the next we may refer to the Minoan-Mycenaean civilisation (say, of the fourteenth century BC). Criteria of different degrees of uniformity will lead to the definition of larger or smaller units.

We should note too that with the passage of time the elements of the system are changed: people die and are born, artefacts are made and discarded. As von Bertalanffy says of organic systems (1950, 155): 'It is the basic characteristic of every organic system that it maintains itself in a state of perpetual change of its components. This we find at all levels of biological organisation. In the cell there is a perpetual destruction of its building materials through which it endures as a whole.... In the multicellular organism, cells are dying and are replaced by new ones, but it maintains itself as a whole. In the biocoenosis and the species, individuals die and others are born. Thus, every organic system appears stationary if considered from a certain point of view. But what seems to be a persistent entity on a certain level is maintained, in fact, by a perpetual change, building up and breaking down of systems of the next lower order: of chemical compounds in the cell, of cells in the multicellular organism, of individuals in ecological systems.' No one is saying here, of course, that a cultural system can be equated with an organic system: but it does share certain properties with them, and with Heracleitus's river: 'A man never bathes in the same river twice.'

Our culture system is also of great complexity because of the nature of its interconnections. Already in talking, say, of trading connections alone, it can be broken down into subsystems. Each single settlement unit can itself be regarded as a subsidiary trading subsystem, and they articulate together to form the overall trading subsystem. The division into subsidiary subsystems here is a spatial one, and can be represented in the dimensions of space.

But the elements of our system are not only linked by connections between localities, such as those of trade. The man-artefact-natural object connections provide food and shelter for men, the man-artefact connections involve the manufacture and use of all manner of things, the man-man connections involve kin relationships, and other social relationships and conventions. This is the consequence of the multidimensionality of man's environment, as discussed above in chapter 1.

We can regard the men in society as nodes in a lattice connected in numerous different ways, each way corresponding to one of the various dimensions of the environment.

In defining subsystems in the culture corresponding to each of these types of connections (and to each of these dimensions) we are not dividing the society spatially but simply following different kinds of networks: 'It must be noted that in a real system the

“diagram of internal connections” is not unique. The radio set, for instance, has one diagram of connections if considered electrically, and another if considered mechanically. An insulator, in fact, is just such a component as will give firm mechanical connection while giving no electrical connection. Which pattern of connections will be found depends on which set of inputs and outputs is used’ (Ashby 1956, 92). In the same way we may picture the incredible complexity of a cultural system, acting in several dimensions and with several different kinds of connections between its components which are itself of several different kinds. In the culture system we are free to define the subsystems. As Wolf has written (1967, 449): ‘We may regard civilisations as social sets, in which the elements are linked together in a large variety of ways and with different degrees of cohesion. Methodologically this means that we do not have to account for all the elements—only for those which we hold to be significant. When considering civilisation the possible choice is almost infinite.’

For our purposes the following subsystems may be distinguished (see fig. 21.1).

1. THE SUBSISTENCE SUBSYSTEM

The interactions which define this system are actions relating to the distribution of food resources. Man and the food resources and the food units themselves are components of the subsystem which are interrelated by these specifically subsistence-oriented activities (see Ch. 15).

2. THE TECHNOLOGICAL SUBSYSTEM

This subsystem is defined by the activities of man which result in the production of material artefacts. The components are the men, the material resources, and the finished artefacts (see Ch. 16 and 17).

3. THE SOCIAL SUBSYSTEM

This is a system of behaviour patterns, where the defining activities are those which take place between men. It is not possible to distinguish clearly all the activities of the subsistence and technological subsystems from those of the social subsystem, but the essential point in the latter is that we are no longer looking at activities under their aspect of food production, or of craft production, but looking at them as patterned inter-personal behaviour. It would be possible here to distinguish an economic subsystem from the social subsystem, but it is probably simpler in a non-market society to look at the accumulation of wealth as a social phenomenon at least as much as it is an economic one (see Ch. 18).

4. THE PROJECTIVE OR SYMBOLIC SUBSYSTEM

Here, we are speaking of all those activities, notably religion, art, language and science, by which man expresses his knowledge, feelings, or beliefs about his relationship with the world. The social system itself may involve activities that are expressive of relationships in this way, that are symbolic of relationships between human beings. Making obeisance before the throne of the ruler would be one of these. But we are defining such expressions between men as belonging within the sphere of the social subsystem.

The projective systems, in other words, are those in which man gives formal expression to his understanding of and reactions to the world. His thoughts and feelings are expressed, that is to say projected, and given symbolic form whether in language or in worship, in the production of written records or of works of art, including music, dance and other abstract forms amongst those of more explicit meaning (see Ch. 19).

5. THE TRADE AND COMMUNICATION SUBSYSTEM

This is defined by all those activities by which information or material goods are transferred between human settlements or over considerable distances. The activities here are all those which involve travel, for any of the components of the system whether men or artefacts (see Ch. 20).

The boundaries between these systems are extremely difficult to define, since a given human action can exist in several dimensions at once. The construction of a temple, for instance, an action of considerable complexity, lies in the first place, in its conception, in the field of the projective systems. It will also involve economic activities. The builders will have to be fed, which belongs in the field of subsistence, and, of course, they will be organised in a manner governed by the social subsystem. This is inevitable since many human actions have a meaning at several levels, with undertones and overtones. And, as we shall see in the next chapter, it is the complex interconnectedness of the subsystems which gives human culture its unique potential for growth.

These are the subsystems whose functioning must be isolated if we are to reach an understanding of growth and change in the culture. In Part II of the present work the growth and development of metallurgy is also given special consideration (in chapter 16) since it was obviously of central importance in the third millennium Aegean, although in more general terms metallurgy is simply one aspect of craft technology. Population, which is a basic parameter of society rather than one of its subsystems, is discussed first, in chapter 14, since population increase in the Aegean, as in most early civilisations, was one of the most significant and relevant developments. These are the terms in which the life of the third millennium BC in the Aegean will be examined.

Feedback

In a culture which is not changing, the various subsystems are in a state of equilibrium (or, in more specialised jargon, of quasi-stationary equilibrium). There is continuous activity: food is grown and eaten, buildings collapse and are repaired, imports and exports are produced and consumed, social relationships are observed, religious services are held. This year, next year, the 'same' things happen: people are born, married, die but nothing is new. This is the working of habit and convention. Hawkes (1954, 155) has emphasised this consistency in the norms of human behaviour. 'The human activity which (archaeology) can apprehend conforms to a series of norms, which can be aggregated under the name of culture.... The notion of norms in man's activity ... is an

anthropological generalisation based on the extensive degree of conservatism shown by primitive man in his technological traditions.... Without this the whole subject would crumble up.' We are all creatures of habit, otherwise we could not face the alarming multiplicity of 'new' problems which would arise. As Samuel Beckett has said, 'L'habitude est une grande sourdine.'

But, of course, the system is not so stable as this: fluctuations in the natural environment alter the equilibrium. Fishing is poor and there are less fish to eat: there are more births than usual and more mouths to feed: it is a wet summer and the roofs leak: an eclipse of the sun is seen as a dread portent. And then there may be 'input' from right outside the system: military attack from another culture, for instance. Or innovations within it: a new tool is invented, or there is dissatisfaction with the conduct of the chief. The remarkable thing is that in every case each subsystem acts homeostatically, to counteract the disturbance. In the subsistence system the level of food is stabilised either by greater investment in fishing, or by switching to other foods. In the utility subsystem roofs are repaired. In the religious system appropriate steps are taken to counteract the alarming disturbance. Military attack is opposed, the new tool replaces the old, the chief takes measures to enhance his authority. Each of the subsystems of the culture is acting like a stabilised or regulated system, in the cybernetic sense. Their variables (food level in the subsistence system, population in the demographic situation, integrity in the defence system, social behaviour in the social system, belief behaviour in the religious system) are kept within assigned limits, as is necessary for survival (Ashby 1956, 197). The behaviour of the culture (and doubtless the artefacts which the archaeologists will recover from it) is essentially unchanged. Various interesting consequences flow from this, for example the need for variety in the culture to oppose undesirable variety outside it (Ashby 1956, 206 f).

Indeed each subsystem can be so regarded as self-regulating. And the different dimensions of life can be considered independently. But at the same time we must remember that in the culture system the component subsystems do not vary independently, they are coupled. This is, of course, simply a statement of anthropological functionalism, that different aspects of a culture are all interrelated. It does not mean, however, that changes in one subsystem *must* necessarily produce changes in all the others.

The equilibrium in a subsystem of the culture is achieved by automatic regulation which acts, like Le Châtelier's principle: 'If a system is in stable equilibrium and one of the conditions is changed, the equilibrium shifts in such a way as to restore the original conditions.' It operates by means of negative feedback: the ability to meet an effect by operating in such a way as to oppose it and thus minimise change. If the food resources of the society suffer a setback (a poor harvest for instance), the society acts in such a way as to restore the level of food supply, for example by trade, and thus to minimise the disturbance. The system acts to counter the disturbing force, so that the feedback is negative.

All this, then, gives us some understanding of the essential coherence and conservatism of all cultures: the behaviour patterns in one generation are communicated to

the next generation: the society's 'adjustment' or 'adaptation' to its natural environment is maintained: difficulties and hardships are overcome. Minor changes may be brought about through ineffectiveness in this communication: the pottery decoration of a daughter may differ a little from that of her mother. But this is merely a 'random drift' which does not in itself have a significant effect on the life of the society. Only if the outside disturbance is so great that the homeostatic controls cannot overcome it, is the life pattern disrupted. 'When a system's negative feedback discontinues, its steady state vanishes, and at the same time its boundary disappears, and the system terminates' (Miller, quoted Katz and Kahn 1966, 96).

Thus, a military attack will be resisted by the society. But if it cannot be overcome, it may well produce a disturbance beyond the limits of tolerance of the system: the system breaks down. Or natural environmental forces may produce a serious disturbance: the increasing salinity of the soil of Mesopotamia was a disturbance which the inhabitants of the Sumerian heartland strove to overcome (Jacobsen and Adams 1958). A similar theory, involving progressive flooding and silting, has been used to account for the decline of the Indus civilisation (Raikes 1965). And the eruption of the volcanic island of Thera certainly brought a total end to the human system occupying that island just as that of Vesuvius to Pompeii. It has even been suggested that the disturbance produced by this eruption was so strong as to exceed the homeostatic controls of the entire Minoan system in Crete and to bring about its disintegration.

In all this the culture system is acting negatively, passively almost, simply acting to regulate outside events. While the negative feedback picture is effective, then, in illuminating the stability and conservatism of the society, it does not explain how society will ever change, except through an outside challenge. It is limited to the Toynbee concept of cultural response to natural environmental challenge.

The systems approach does offer also a convenient model for growth, for change occurring *within* a society. Negative feedback itself is never a sufficient explanation for cultural development, for how culture came into being, but merely for how an existing order was modified through external change. Change, progressive change, can however be considered in terms of deviation-*amplifying* mutual causal systems. 'Such systems are ubiquitous: accumulations of capital in industry, the evolution of living organisms, the rise of culture of various types, the inter-personal processes which produce mental illness, international conflicts, and the processes which are loosely termed "vicious circles" and "compound interest", in short all processes of mutual causal relationship that amplify an insignificant or accidental kick, build up deviation and diverge from an initial condition' (Maruyama 1963, 164).

Kent Flannery (1968, 80) has described such a *positive feedback* system which operated in the system of wild grain procurement in early Mesoamerica and resulted both in the selection for genotypes of the domesticated maize and in the development of food production. As he well says: 'The use of a cybernetics model to explain prehistoric cultural change, while terminologically cumbersome, has certain advantages. For

one thing it does not attribute cultural evolution to “discrepancies”, “inventions”, “experiments” or “genius”, but instead enables us to treat prehistoric cultures as systems. It stimulates enquiry into the mechanisms that counteract change or amplify it, which ultimately tells us something about the nature of adaptation. Most importantly, it allows us to view change not as something arising *de novo*, but in terms of quite minor deviations in one overall part of a previously existing system, that once set in motion can expand greatly because of positive feedback.’

A culture, as we have seen, may be considered as composed of coupled systems, and the nature of their coupling is very relevant here and has to be considered. Its stability and growth is determined by the behaviour of these systems-in which human beings participate, of course, and human ideas, so that the growth is not ‘determined’ in a materialist sense. As Maruyama has written (1963, 178): ‘Sometimes one may wonder how a culture, which is quite different from its neighbouring cultures, has ever developed on a geographical background which does not seem to be in any degree different from the geographical conditions of its neighbours. Most likely such a culture has developed first by a deviation-amplifying mutual causal process, and has later attained its own equilibrium when the deviation-counteracting components have become predominant, and is currently maintaining its uniqueness in spite of the similarity of its geographical conditions to those of its neighbours.’

This, then, is the growth process which we are seeking to analyse and which can be discussed with the minimum of jargon, although terms such as positive feedback and negative feedback are necessary. In the next chapter an attempt is made to look more carefully at the precise conditions which may give rise to growth, and not only to growth in size but to fundamental changes in the structure of culture, leading ultimately to the emergence of civilisation.

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Growth and development in the various individual fields of human activity in the third millennium are not in themselves sufficient, however, to explain the decisive changes which are seen in the Aegean world around 2000 BC. It is the basic theme of the present chapter that the decisive nature of such growth was determined by the interaction of the subsystems in the culture system of the Aegean, rather than simply in terms of the growth in each. For instance the effects of agricultural advances upon the social organisation, or of social factors upon craft production, are far more relevant to the growth of the system than the changes themselves, taken in isolation. Once again this question is discussed first in general terms. In chapter 21 the conclusions are applied specifically to the formation of Minoan-Mycenaean civilisation.

Civilisation is not the product simply of growth in size, but of innovation: innovation which is accepted and becomes part of normal human behaviour, and so part of the shared environment. In seeking to explain civilisation we are seeking to analyse how and why man's total environment changed, and how he came to produce the artificial environment which encompasses civilised man in every dimension of his existence. We are concerned, then, with innovations which influence this environment and the mechanisms which led to their assimilation.

This assimilation of innovations is related to the creation of variety, but not simply of a variety within established categories—for example a wider range of decorative motifs for a given range of ceramic objects. It is variety in the production of new categories, new activities, new products, not simply elaboration among the old ones. This idea is applicable to living systems in general: 'Growth, a progressive, developmental, matter-energy process which occurs at all levels of systems, involves (a) increase in size -length, width, depth, volume—of the system, and commonly also (b) rise in the number of components in it; (c) increase in its complexity; (d) reorganization of relationships among its structures—subsystems and components—and their processes, including differentiation of specialised structures and patterns of action; and (e) increase in the amounts of matter-energy and information it processes' (Miller 1965, 372).

Innovations occur all the time in any society: new ideas which crop up rather haphazardly, rather like mutations in the organic world. They are not individually predictable. But what is crucial is the response to these innovations. If the innovation is rejected, there is no effective change. But if accepted it can be further modified. Since the new activity will not be so bound by convention—society's chief self-regulating mechanism—as is one longer established, it will itself be more open to yet further innovation. Of course the stabilising and regulating effects of habit and well-established behaviour patterns have the beneficial outcome of countering innovations which may disrupt the order of society. But they automatically inhibit change of any kind.

The early development of metallurgy suggests a striking instance of such inhibition. Hammered copper was used at numerous early neolithic sites in the Near East, and copper was even smelted at Çatal Hüyük. But, although pottery manufacture was already requiring the controlled production of high temperatures, and efficient and widespread metallurgy would thus have been perfectly possible, the bronze age in these areas did not begin until nearly three millennia later.

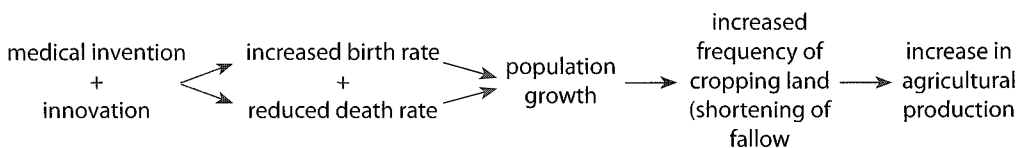
Two recent considerations of growth and change in human society are illuminating at this point. The first, by Boserup, examines the mechanism of growth in the subsistence subsystem. The notion of positive feedback, discussed in the last chapter, is here a particularly helpful one. The second, Rostow's analysis of the conditions necessary for 'take-off' in an economic subsystem, leads us to the central idea of the present chapter, that it is the interactions *between* subsystems, not merely within them, which are crucial for sustained growth. Just as the Boserup/Malthus controversy underlines the concept of feedback operating within the subsystem, so Rostow's treatment leads to the consideration of feedback between the subsystems. It is here that the multiplier effect operates.

The analysis of growth in a single subsystem: farming technique and population

The model of human culture as a system composed of subsystems is especially appropriate for a consideration of the process of growth. To take a specific example, the disagreements with the views of Malthus which Boserup (1965) expresses in her informative work become much clearer when viewed in this light. She is concerned particularly with farming techniques, and with the transition which has taken place in many parts of the world from extensive farming, where much of the land lies fallow, to intensive farming. Her thesis is essentially the opposite of that of Malthus and his followers: 'Their reasoning is based on the assumption that the food supply for the human race is essentially inelastic, and this lack of elasticity is the main factor governing population growth. Thus population growth is seen as the dependent variable, determined by preceding changes in agricultural productivity, which, in their terms are explained as the result of extraneous factors such as the fortuitous factor of technical invention and imitation' (Boserup 1965, 11).

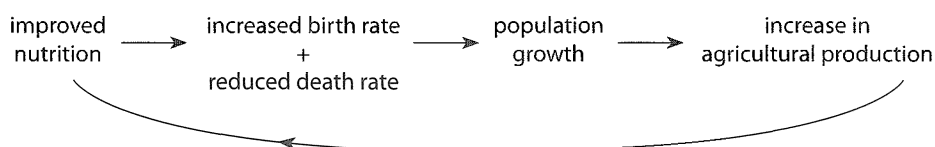
She explains that the subsistence pattern adopted in a given region is not simply determined by geographical factors: it is governed to a large extent by the population which that land has to support, and by the population's own decisions about agricultural techniques. For her 'population growth is ... the independent variable which in turn is a major factor in determining agricultural developments.' And the intensity with which the land is cultivated is, to a large extent, a function of the population which it has to support.

One of the easiest ways to cultivate the land (in terms of labour costs per unit of output) is forest fallow cultivation, where, after clearance by fire, and cropping for a year or two, the land is left uncultivated for a couple of decades. Only with the need to increase the yield per unit area (albeit often, at first, at the cost of increasing also the labour cost per unit output) is a change to a short fallow system undertaken. 'It is more reasonable to regard the process of agricultural change in primitive communities as an adaptation to gradually increasing population densities, brought about by changes in the rate of natural population growth or immigration' (Boserup 1965, 118). The logical structure of her explanation may be analysed as follows:



This conflict between Boserup and Malthus seems in essence an instance of the 'which came first' problem, the universal difficulty in distinguishing between cause and effect. As Boserup herself has written (1965, 117): 'It is often difficult or impossible to determine

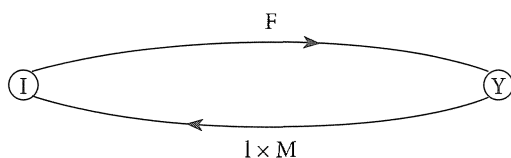
through historical research whether the demographic change was the cause or the effect of changes in agricultural methods.' I suggest that a clearer summary of the position can be obtained by accepting that population and agricultural methods are mutually influential, and by abandoning altogether the search for an 'independent variable'. Boserup's work has indeed been criticised as stressing too heavily the supposed 'independence' of population growth (as well as the flexibility in response to it of the cultivation system), and to recognise the interdependence of such factors would seem to do more justice to the complexity of the situation. The factors may be linked by a feedback loop, with which systems theory is particularly equipped to deal.



Admittedly the feedback loop only functions under certain conditions: the increase in production only implies increased nutrition if it is actually a per capita increase in production. But undoubtedly an increase in production increases the number of persons who can be fed at a given daily dietary intake.

If the population growth is to be sustained, either the 'independent variables' favouring population growth (such as improved medical facilities) must continue to act in such a way as to favour population growth, or there has to be some positive feedback in the system, whereby the increase in food production favours further population growth.

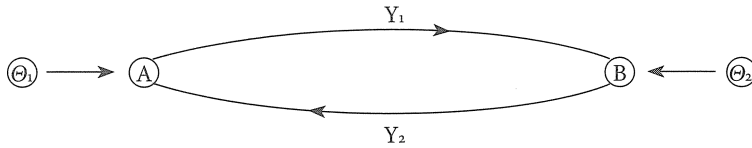
Situations of this kind are well known in most branches of systems theory, from biology to cybernetics. The closest analogy, perhaps, lies in the field of economic theory, where Tustin (1953, 35), for instance, illustrated a scheme of dependence of this kind, for a closed sequence system for investment (I) and income (Y).



The closed sequence is supposed to be constituted by a response or feedback proportional to rate-of change of income Y with a time delay t . And given these assumptions, the growth of the system (i.e. the future values of Y) can be predicted.

This example is, of course, a closed system, where all outside influences are excluded from consideration, and all living systems, including human societies, are open systems. But Tustin (1953, 159) later discussed how the nature of the interactions of two inter-

dependent variables, which are also subject to independent outside influences, may be studied.



Here Y_1 represents that circumstance that A affects B, and Y_2 that B affects A. The variation of quantities exogenous to this pair is represented in the schema by inputs Θ_1 and Θ_2 . Tustin's discussion clarifies some of the features of such a relationship, and especially the assumptions and the information which are needed in order to produce an explicit analysis. In the case of interactions between population (A) and food production (B) the relationships are complicated. Y_2 implies that the level of food production sets an upper limit upon the population which can be supported, but it does not itself determine the population, which is governed also by other factors (Θ_1). And Y_1 indicates that the population available sets restraints on the amount of food which can be produced. Boserup's thesis is that in governing the mode of food production as well as determining the available work force, the population is the significant determinant for the level of food production. But other variables also govern the food production.

Regrettably it is difficult to give these relationships precise quantitative expression, but even so the form of Tustin's analysis, and the necessity it creates for the explicit formulation of underlying assumptions, are useful in suggesting the scope of a systems analysis made under ideal circumstances. His formulations, for instance, make entirely clear how growth cycles occur under certain conditions, and this is of relevance to population studies, even if some of the variables cannot be determined with precision.

In Boserup's analysis, the trend towards shorter fallow which she describes does not in itself amount to true economic growth, since the output per man-hour is at first diminished. But here she indicates 'secondary effects' which are relevant to our main concern, the emergence of civilisation. Amongst these are the compulsion of agricultural workers to work harder, and the division of labour, accompanying improved communications and better education which the increased population density favours. 'The important corollary of this is that primitive communities with sustained population growth have a better chance to get into a process of genuine economic development than primitive communities with stagnant or declining population' (Boserup 1965, 118).

The conclusion which Boserup reaches, although formulated with the problems of the underdeveloped and developing countries of the modern world chiefly in mind, seem particularly relevant to the development of early civilisations, including that of the Aegean:

'According to the theory propounded above, a period of sustained population growth would first have the effect of lowering the output per man-hour in agriculture, but in the long term the effect might be to raise labour productivity in other activities, and

eventually to raise output per man hour also in agriculture. In a development pattern of this kind there is likely to be an intermediary stage where labour productivity in agriculture is declining while that of other activities is increasing. This period is likely to be one of considerable political and social tension, because people in rural areas, instead of voluntarily accepting the harder toil of more intensive agriculture will seek to obtain more remunerative and less arduous work in non-agricultural occupations.'

Here Boserup is, in effect, asserting the *connectedness* of the subsystems of the society, since social factors, efficiency of communication and work-preferences now bear significantly upon the development of agriculture. The growth and development of farming cannot be analysed adequately without taking into consideration the other subsystems of the culture.

This analysis of agricultural growth is quoted here at some length, not simply because it is informative in its own right. It touches also on the crucial question of the impact upon the growth and development of a given subsystem of those 'secondary effects' which its developments have produced in other subsystems, and which in turn have their influence on the further growth of the subsystem in question. An economic analysis by W. W. Rostow is helpful in indicating more clearly the nature of these interactions.

Growth and 'take-off' in an economic subsystem

A second informative and stimulating approach to economic growth focuses on just this problem of the interaction of different factors (Rostow 1953). And again the analysis is in terms of factors primarily *within* the system. Rostow's own interest again lies in the problems of developing countries, and the circumstances favourable to their economic 'take-off'. Our own lies in the possible analogy which this suggests for the 'take-off' leading to the formation of early civilisations, and on the insight it may give into the way interactions operate between the component subsystems of the culture.

The analogy is not, of course, a complete one, since none of the early civilisations which we have in mind move beyond Rostow's traditional stage. Yet there are interesting and suggestive parallels between the process of growth from traditional to industrial civilisation, and that from subsistence economy to early civilisation, the transformation which we are seeking to explain.

Rostow's approach is basically one of common sense: its originality lies in a willingness to consider a multiplicity of long-term factors, and above all in the attempt 'to treat changes in the rate of growth as determined by the workings of the fundamental variables in the system rather than as the consequence of exogenous forces'. It is this which makes his work relevant to the present problem.

His analysis of the forces governing changes involves three basic statements about the workings of society:

1. The economic output is determined by the size of the working force, the society's stock of capital, and its stock of knowledge. The rate of growth is therefore a function of the rate of change of these factors.

2. The first of these factors is itself governed by five 'economic subvariables': these comprise the rates of birth and death (prior and current), the role of women and children in the working force, and the skill and degree of effort of the working force.

The second factor, the size and productivity of capital, is seen as governed by six subvariables, namely the volume of research in pure and applied science, the proportion accepted of the flow of innovations, the balance between consumption and current investment, and the yield from additions to capital stock.

3. These economic subvariables are themselves seen as dependent upon six further variables or propensities, 'the human determinants of economic action': the propensity:

to develop fundamental science
to apply science to economic ends
to accept innovations
to seek material advance
to consume
to have children.

These 'propensities' are in turn seen as 'a function of the prior long-period operation of economic, social and political forces which determine the current social fabric, institutions and effective political theory of the institution'. Clearly these propositions do not offer an explicit quantitative analysis of the growth which they set out to explain. But they 'are designed to constitute a link between the domain of the conventional economist on the one hand, and the sociologist, anthropologist, psychologist and historian on the other.... They also aim to provide a focus for the efforts of non-economic analysis interested in economic phenomena ...'

Rostow's book goes on to analyse the problems of modern developing societies in these terms. The interest of these ideas here is the explicit realisation 'that actions which result in economic advance need not be motivated by economic goals'. The analysis of an economic subsystem is dependent on 'propensities'—such as the acceptance of innovation, or consumption, which are only in part economic and are not necessarily governed by economic factors. Indeed of these six propensities only the last two fall directly within the scope of Malinowski's 'primary needs', mentioned in chapter 2 (Malinowski 1960, 91).

These are variables which, while endogenous to the society in question, may be regarded as exogenous to the economic subsystem. Once again the interrelations between subsystems are seen as crucial. 'Economic action is ... the outcome of a complex process of balancing material advance against other human objectives ...'

In the second part of this book the developments in the Aegean early bronze age, which led to the establishing of Minoan-Mycenaean civilisation, will be considered.

They may profitably be regarded in this way, taking economic changes not in isolation but within the context of their impact on the society as a whole. For it is this impact, most clearly evident in social terms, which determines the long-term features of the economic progress in question. It is clear that the early bronze age of the Aegean was a period of change. Many innovations were widely accepted in the Aegean at this time and subsequently, when an international spirit, a cosmopolitan feeling, can be detected. The obvious superiority of the metal tools and weapons, for instance, over their stone counterparts may have led to their rapid acceptance. This in turn led to the adoption of other new methods and ideas. This was a time of change, change induced indeed partly by the sudden significance of metal. And in such times of change, as Boserup hinted, other innovations seem to have found ready acceptance. The propensity to accept innovations does indeed seem a significant factor in considering these developments.

The metallurgical and other technological developments discussed in chapters 16 and 17 do indeed show a notable dynamism in the development and application of new techniques and processes. The bearing of Rostow's first two propensities is obvious, although in the early Aegean there was hardly a valid distinction between pure and applied science.

Above all, the propensity to seek material advance, and to consume, are factors which are relevant to the origins of Aegean civilisation. They are often overlooked in analyses of culture change, or even dismissed as 'superficial reductionist'. (It must none the less be admitted that the simple naming of 'propensities' is in itself far from an explanation of growth, but merely a first step in that sense.) For instance, the development of metallurgy actually created new forms of wealth, and indeed new forms of consumption. The propensity to consume was undoubtedly given new scope by its introduction.

Probably, however, in most prehistoric societies the propensity to seek material advance was still limited to a large extent by social factors. A Mycenaean prince, for instance, might well deliberately accumulate wealth in order to dazzle and influence both his subordinates and his peers by its display. But we may question whether there was any very high degree of social mobility at this time, and whether social advance could effectively be secured by increased work or production.

The analysis does, however, suggest an emphasis on one feature common to all civilisations: a willingness to invest income and hence to accumulate what may be regarded as capital. Both goods and labour were lavishly employed in the construction of significant religious or social centres, often of palaces. At first sight much of this investment was unproductive, contributing solely to the magnificent appointments of the palace or to the rich burial goods which accompanied the prince and his family to the grave. But this is to overlook the socially cohesive effects of such investment. And the production of these increasingly magnificent objects (the increase itself a sign of willingness to accept innovation) was the only possible way of conducting 'research' in the fields of pure or applied science. In prehistoric times most knowledge was practical knowledge—and this does not, of course, exclude religious experience, since religion is itself to be re-

garded in functional terms as a special technology. Innovations must have arisen most frequently not from deliberate research and its application, but from the 'spin off' consequent upon the developing production processes employed in the palace or temple workshops and beyond.

The palace, as the area of highest population density and the location of the majority of specialist processes (at least in the Minoan-Mycenaean world), from metallurgy to accounting, constituted—together with its implicit social system—the main capital stock of the community. And 'whether a rate of growth can be sustained depends on whether investment ... is sustained' (Rostow 1953, 95). The developing social system ensured that both investment and the rate of growth were indeed sustained.

This emphasis upon the propensities to consume and to seek material advance is of course not a new idea, and many economists stress that sustained growth over a considerable period requires modifications of economic and perhaps social organisation. As J. K. Mehta has written (1964, 95), continued growth of real income depends 'on the extended use of the ability to plan and organise human efforts. It is organisation whose elasticity can ensure a sustained rate of growth of national income.

'If there is any factor that possesses elasticity in a degree that we need for growth, it is organisation. This factor, which is perhaps capable of stretching itself to any required limit, is behind growth. But circumstances must be favourable to enable it to stretch itself. These circumstances are related in the final analysis to the behaviour of producers (determined partly by their habits and partly by their psychological reaction to consumers' behaviour) and the behaviour of consumers.

'For the study of growth it is necessary, therefore, to make some plausible assumptions about the behaviour of buyers of productive services (producers) and those of consumption-goods (consumers).'

Of course the language of economics, formulated where a money currency establishes a precise and stable equivalence between different kinds of goods and services, cannot be applied to societies without a formal exchange system. It is absurd to read into early societies the economic concepts of modern marketing and currency. Such statements as these cannot be directly applied, but at the level of analogy they are certainly indicative of relevant factors.

At a certain point, indeed, the analogy between economic growth and the growth of a culture or civilisation breaks down. In the first place an important criterion which the economist takes to indicate the transition from a preponderantly agricultural basis to an industrial one is the rate of increase in per capita output. In the essentially non-industrial society of the prehistoric Aegean, even at the peak of its development, the rate of increase, however measured, cannot have been very great. Moreover, such an economic analysis, while refreshingly considering the effect of nonmaterial factors on economic growth, is still restricted in its scope to the growth of the economy, not to the development of the culture as a whole. The analysis does not, therefore, offer full scope for a consideration of the interactions of all the factors relevant to this larger problem,

although it works in the same sense. But it is precisely this question, as to how changes in one field of human activity—in one subsystem of society—produce changes in another, which requires further consideration.

The multiplier effect, and the interaction between subsystems

One of the distinguishing features of human societies is the extent to which changes within one subsystem of society bear upon other subsystems. Population does not simply grow, for instance, and then reach a stable level, governed purely by environmental factors, as it might in the case of most animal populations. Instead a dynamic interaction is set up between the population level and the means of food production. There is innovation, and the acceptance of innovation. A new adaptation is seen: a new farming mode, which amounts to a new structure of food-production procedures, a new configuration among human activities. In the terms discussed above, there is very considerable elasticity in organisation.

The growth which we are here considering consists in the establishment (and survival) of new relationships, new patterns of activity. This often implies the desuetude of many of the old relationships and activities, so that the changes which result are often irreversible. The analogy in the organic world of nature is here not with the growth of a single member of a species (the ontogeny), since this implies no real innovations in patterns and relationships already established, and is largely a question of size, of scale. It lies rather with the evolution of a new species (the phylogeny) where real innovatory changes, the result in this case of mutation, lead to new adaptations and the irreversible movement away from old ones.

Systems theory has indeed made clear to us the way in which 'regulators' can achieve a dynamic balance in a system. And most branches of human activity, as we saw in the last chapter, are governed in the same way. Human conduct is regulated by all the rules, pressures and incentives of society: there are ways things are usually done, and things which are not done. Indeed it is generally normal in a human culture for things to go on much as they have before.

Here, however, the problem is a different one. The regulatory efficacy of culture is accepted. The question is now the opposite one—how and why does it change or grow?

Growth in numbers or in size is itself inhibited by the regulatory mechanisms. When the birth rate rises very rapidly, for instance, the death rate may also rise, and population growth is limited. These restricting mechanisms can only be overcome by deviation-amplifying mechanisms which actually favour growth of certain kinds. This is the positive feedback also discussed above. In favourable circumstances 'one thing leads to another'. A change, for instance an increase in capital investment, leads to an increase in production. And this outcome works now to amplify the initial change by allowing a further increase in investment. In this way a 'growth cycle' develops, subject to what

the economist calls the Law of Diminishing Returns. After a period of sustained change or growth, further change (e.g. further investment increase) no longer has so large an effect as before (e.g. on output). A kind of saturation is reached, and the growth ends. The feedback, in other words, is no longer positive.

Once again there are analogies in chemistry: we have already seen above that when a chemical reaction is reversible, a negative-feedback regulator operates, designated Le Châtelier's Principle. But when the reaction is irreversible this does not hold. In some reactions, which are self-catalysing, the faster a reaction is taking place the faster its rate increases: this is a positive feedback situation. But later, often as the available resources are used up, the reaction rate falls again: by analogy we may say that the law of diminishing returns is operating.

The growth of human societies is not always subject to this law of diminishing returns precisely because the underlying structure is itself changed in the growth process, just as in the economic situation summarised by Mehta above. Innovations arrest or negate the operation of the usual limiting factors. This change of structure is something the cyberneticist can hardly handle yet—the structures of the systems with which he deals do not generally transform themselves into something different.

The key to this process in human cultural development lies in precisely the interconnectedness, identified in the preceding section, among the different activities of the individual in society, the interdependence of the subsystems of society. There is, indeed, a new kind of positive feedback among innovations—an innovation in one subsystem tends to favour innovations (and their acceptance) in another, in a manner quite foreign to the other species of the animal world. (Although there may be a superficial analogy with the working of 'explosive evolution' in organic evolutionary development.)

I propose to term this mutual interaction in different fields of activity, this property of human systems that an innovation (and its acceptance) in one subsystem favours innovation in another, this interdependence among subsystems which alone can sustain prolonged growth, the multiplier effect.

This term does not simply imply positive feedback, as in the 'accelerator' and 'multiplier' of the economists. It indicates the process whereby changes in one field of human activity can significantly influence changes of quite a different kind in another field. The following definition of the multiplier effect seeks to emphasise this distinction from the usual working of positive feedback within a single subsystem:

Changes or innovations occurring in one field of human activity (in one subsystem of a culture) sometimes act so as to favour changes in other fields (in other subsystems). The multiplier effect is said to operate when these induced changes in one or more subsystems themselves act so as to enhance the original changes in the first subsystem.

This, then, is a special kind of positive feedback, reaching across between the different fields of human activity. The term multiplier used in this sense implies rather more (although with less precision) than the technical term 'multiplier' in economic theory,

as formulated by Kahn and used by Keynes with reference to employment and income (Keynes 1937, 115-16). Already it has been extended beyond this original use by geographers who speak of regional multipliers (cf. Chisholm 1966, 99) to elucidate the way in which industrial expansion, within a specified area, has secondary effects there, arising from the presence of the new population and the need for service industries:

'This analysis stresses the interrelations of sectors *within* a regional economy and the spread of impulses originating in anyone sector to all other sectors either directly or indirectly. Such spreading in essence has a multiplying result. Through the continuous back and forth play of forces (or round-by-round process of interaction), such spreading leads to a series of effects on each sector, including the original one, although these effects need not always be in the same direction, and of significant magnitude. The relevance of multiplier studies for programming regional development is obvious. It neatly points up how growth in one sector induces growth in another. The relevance of such studies for understanding regional cycles is also obvious as soon as we recognise that some impulses may be positive, others negative; some expansionary, others deflationary' (Isard 1960, 189).

Here, however, we are concerned not solely with different sectors in the economy of a cultural region, but in the different sectors in the culture as a whole, without restricting the discussion to purely material or economic considerations. We are extending the meaning of the term beyond its conventional one as an aid to analysis of feedback effects within the economic system. In discussing the growth and development of culture the independent growth within the component subsystems is naturally itself of interest. But we are now using the term to designate the effect of their mutual interconnectedness, which favours positive feedback between the different components of the culture system as a whole.

Identification of the multiplier effect in the culture system is illuminating not solely because it allows us to visualise, and in this sense understand, the growth of a system in terms of factors endogenous to it. Above all it focuses our attention on their interrelationship. It is a commonplace of 'functional' anthropology that all aspects of a human culture are ultimately interrelated, and that changes in one aspect should affect other aspects of the culture. The definition of the multiplier effect in the field of human culture is an invitation to investigate the mechanisms of this interconnectedness.

The multiplier effect and the emergence of civilisation

When the multiplier effect comes into operation, and remains in operation, there is sustained and rapid growth, not merely in the scale of the systems of the culture but in their structure. Changes in one area of human experience lead to developments in another. In this way the created environment is enlarged in many dimensions, and itself becomes more complex. This is, as we have seen, something more complicated than the operation of a simple positive feedback, causing growth and amplifying the

processes already present: it is a feedback system with coupled subsystems, favouring innovation.

The conditions for the multiplier effect to come into operation in such a way as to result in sustained growth in the different sectors of the culture require close consideration. Some writers have spoken of a threshold or take-off point beyond which striking developments occur. To investigate this threshold is essentially to seek the circumstances which bring the multiplier effect into active operation.

When the emergence of civilisation is considered, it seems that the crucial requirement is that there should exist the possibility for sustained growth (and for positive feedback) in *at least two* of the subsystems of the culture. Clearly, if none of the subsystems were free, through the favourable influence of changes in the society, to grow and develop (e.g. agricultural production to increase through the adoption of more intensive farming procedures), the culture has no potential for growth. And if only one subsystem develops in this way, and the multiplier effect does not operate, the nature of the culture as a whole will not fundamentally be changed.

The 'temple' culture of Malta seems an obvious case where a single subsystem, involving religious activities and the construction of the great temples, clearly underwent dramatic expansive developments. But for whatever reason this does not seem to have produced detectable positive developments in other subsystems (whether technological or economic). Why this should have been so remains to be investigated—perhaps limited agricultural potential, and the lack of raw metals were significant negative factors—but the outcome was not a civilisation, merely a neolithic culture boasting remarkably sophisticated temples.

It seems that no single factor, however striking its growth, can of itself produce changes in the structure of the culture. For a 'take-off' at least two systems must be changing and mutually influencing their changes.

The Sumerian civilisation has at times been attributed primarily to the invention of irrigation, a single factor which supposedly yielded a food surplus, and made possible the Mesopotamian class structure, with its priests and princes, and the growth of the city. This notion of a food 'surplus' as the 'cause' of further growth has been effectively demolished by Harry Pearson (1957, 320) and George Dalton (1960; 1963). It is inevitable, of course, that any society which has non-food-producing specialists of any kind must have a subsistence situation whereby one food-producer can produce more than he eats. But the term 'surplus' in a non-market, non-money economy is without meaning, indeed a contradiction (Dalton 1960, 485): if it refers to an experienced growth of output, it would be better to say so. As Dalton (1963, 389) has forcefully asserted: 'To attribute the existence of non-food producers to a food surplus—in the sense that a growth in food supply actively caused the priests and rulers to arise—is, to put it bluntly, silly.' When French farmers dump their artichokes in the road during a glut, there may well be a surplus, but in what sense is the Sumerian peasant's contribution to the temple 'surplus', or the goods destroyed in a potlatch? To regard all subsistence products not actually eaten by the producer and his family as 'surplus', and to ignore the real

significance of activities even so apparently wasteful as a potlatch, is to make so total a distinction between the subsistence economy of the neolithic and the craft economy of early civilisations that the gap cannot be bridged. As Pearson (1957, 339) has said, referring to the many societies where 'potential surpluses' are available (i.e. where an increase in food production would be possible): 'What counts is the institutional means for bringing them to life. And these means for calling forth the special effort, setting aside the extra amount, devising the surplus, are as wide and varied as the organisation of the economic process itself.' Dalton (1963, 392) points out: 'In *some* circumstances a growth in food supply may be a necessary condition for social change to come about: *it is never a sufficient condition*.' This is very relevant to Minoan-Mycenaean society, as doubtless to all early civilisations. Indeed he goes on to state: 'In other circumstances, as we are now learning from economic development in primitive areas, just the opposite may be the case: social change may be a necessary condition for allowing an increase in the food supply to take place.'

Since civilisation, with its artificial environment, does imply some specialisation, every civilisation must have an economy which has progressed in some senses *beyond a subsistence economy*. But this does not mean that the growth of civilisation was 'caused' by improved food-production techniques, which may indeed in some cases have long been available. In many cases, I suggest, it did in fact come about through innovations in such techniques *coupled with* social and other developments which at the same time made these subsistence improvements both possible and desirable.

Robert Adams, on the other hand (1966, 12), draws 'the conclusion that the transformation at the core of the Urban Revolution lay in the realm of social organisation'. This view now seems to tend rather towards the other extreme, and recognise as 'cause' what was previously identified as 'effect', and vice versa. One is reminded here of the rather similar divergence in the views of Malthus and Boserup, where the former regarded the food supply as the 'independent variable', and the latter the population density. For indeed, as Adams himself has stressed, the social organisation could not have emerged without the possibility of increased per capita food production among the agricultural producers. The two developments are coupled and cannot with profit separately be labelled 'cause' and 'effect'.

The implication of this view, which can indeed be formulated as a testable prediction, is that we shall not expect the archaeological record for the early development of a civilisation to show greatly improved production techniques (e.g. irrigation) and 'surplus' storage facilities arising prior to, or without evidence of social stratification (e.g. palaces) or religious specialisation (e.g. temples). Nor shall we, in the cases where the successful transition to civilisation was later accomplished, expect these social and religious advances to have developed markedly without developments also in food production. On the contrary, the two were linked by the multiplier effect, and it was their coupled expansion which led to rapid changes in the culture in general.

In the same sense, the development and increase of trade, for example in the early Aegean, cannot alone be regarded as the principal factor leading to the development

there of civilisation. Without its strong interaction with other sectors of the culture, such as social organisation, the multiplier effect could not effectively have operated.

We may even suggest that social stratification itself is not automatically a necessary contributing element in the growth of civilisation, although the emergence of certain new social structures would indeed seem inevitable. The documented remains of the Indus civilisation, for example, are notably lacking in evidence for great personal wealth, and so far, although public and communal buildings are known, there are no great temples or rich palaces. We can imagine (perhaps a shade frivolously) a socialist state, with communes and with specialists, yet without social stratification in the sense of a hierarchical, rank-order structure in the society. Such a state would have a developed social organisation, of course, but not a pronounced social stratification.

It is, of course, at the level of the individual in society that the multiplier effect actually operates. And it is through the individual that social pressures, for instance, have an economic significance, for, as outlined in chapter 2, the various subsystems of the culture are linked at the level of the individual. It is therefore by a consideration in terms of individuals, on a micro-economic scale, that the precise mode of operation of the multiplier effect must be elucidated.

On a micro-economic scale, then, the farmer in an ideally simplified neolithic society produces enough for the needs of himself and his family. There is little point in producing much more food than they can eat, since there would be nothing for him to do with it. (He thus avoids a surplus, except in occasional years of unexpectedly high crop yields.) His needs are satisfied. His environment is stable.

Various innovations may work to change this situation. The social subsystem may require of him some conspicuous act of generosity or prosperity (such as a potlatch contribution) to maintain or enhance his prestige. Here then is a crucial new concept (although one implied in Rostow's schema)—a derived secondary need in Malinowski's sense.

Equally some personal ill- for example a sudden death in the family—may require him to propitiate the supernatural forces by some means. Or he may believe (in common with his society) that the efficiency of the world—for example the fertility of his crops and cattle—can only be ensured by his participation in the religious order. Here religious dread, or some specifically formulated cosmological concept, require certain actions: the projective subsystem imposes material obligations.

Or warfare between villages may necessitate his neglecting his crops, and perhaps making material contributions of various kinds. Here competition, a further 'derived need', is operative (cf. Rapaport 1967).

I find it impossible to envisage an explanation for change and growth in society without some reference to the 'new needs' which the operation of such factors produces, the material demands and obligations arising from social and religious considerations. Man shows great mobility or elasticity in his requirements: workers today will withdraw their labour on the grounds of unsatisfactory conditions, which would have been accepted as generous a century ago. A telephone, a car, a television set are legitimate

needs in the city today, while a generation or two ago they belonged to the realm of fantasy. No explanation for culture change which fails to acknowledge the appearance of such new needs can be effective.

Of course there is evidence for competition and display among other animal species (Wynne-Edwards 1962), and it is not their existence, but the way the society is adapted to facilitate them, which is a unique feature of human culture. And the line of argument can become a circular one if we 'explain' a new feature 'because' we believe there to have been a 'need' for it. A more thorough investigation of the nature and working of these 'needs' and 'propensities' is demanded.

Some of the developments within a culture can indeed be explained without reference to 'secondary needs' of this kind. We can suggest that any society (or indeed animal) seeks improved control over its natural environment. The system, as we have seen, works to minimise the effect of a disturbing influence. Moreover it will tend to do so with the expenditure of least energy. Man, like nature 'takes always the shortest path, for it is the most natural' (Marcus Aurelius, *Meditations*). 'La natura non opera con l'intervento di molte cose quello che si può fare col mezo di poche' (Galileo, *Dialoghi dei Massimi Sistemi*, Day 2). We can apply the Law of Parsimony to man as well as to nature (Zipf 1949, 5). Any increase in efficiency, involving less work for the same results, may *a priori* seem an improvement. And yet even here there are many instances where cultural factors appear to operate in the opposite sense by impeding the acceptance of innovations which would increase efficiency in certain sectors.

Without acknowledging competition as a significant factor there is no way of explaining, for example, the introduction of weapons. And, above all, without acknowledging a desire for prestige, and the principle that prestige frequently relates to wealth, it is difficult to explain social stratification. These propositions do not, however, amount to natural or universal laws for human behaviour—in a monastic order of poverty, for instance, the monk who cannot bring himself to discard earthly riches may be little esteemed.

Most of man's activities exist in many dimensions, as the discussion in chapter 2 sought to show. To draw a further analogy with economics, man's 'currencies' within the different dimensions are to some extent interchangeable. Prestige can be related to economic gain, while religious fulfilment may adequately be substituted for the latter. The notion that 'every man has his price' implies that material goods can be set against a 'currency' in the social dimension, such as honour. Moreover in each dimension man shows considerable income elasticity of demand: 'the more you have, the more you want'. In non-monetary and non-market societies these are not scalar quantities—a man may set life above love, love above honour, and honour above life—and no universal equation is possible. As Rostow implies, it is this interaction between the various dimensions of human existence which, together with man's income elasticity of demand in various fields, makes culture growth possible.

A palace, such as is found in many early civilisations, has functions which far exceed the primary one of providing bodily comfort for a segment of the community. And a

temple, whatever its history, is referable also to a quality or propensity in human beings not discernible in other animals. No explanation of civilisation can proceed without recognising this basic difference in potential among species, although we cannot expect to explain these fundamental circumstances—that is the province of psychology, of physiology, of cybernetics perhaps, and of biochemistry. Our explanation must start by assuming that all societies of men share these potentialities, for at present there is no convincing evidence that they do not. Obviously an explanation in terms of group or racial ‘superiority’ or ‘creativity’ is to be rejected at once, unless there are striking and conclusive new observations in anthropological science to warrant such a theory. The explanation which we are seeking operates, rather, within the field of man–environment interactions, to trace how innovations and their acceptance produced irreversible changes in certain cultures, leading in some cases to civilisation.

The story of the development of these innate human potentialities during the process whereby *Homo sapiens* emerged from his predecessors belongs largely to the field of physical anthropology. But most anthropologists believe that man as born today does not differ significantly from man as born 10,000 years ago. In analysing the genesis of a civilisation we are operating, therefore, in the domain of cultural development and evolution, not of strictly biological evolution.

As this chapter has tried to outline, we have a possible formula for the explanation of culture change. It is accepted that societies and cultures live in a state of equilibrium: the subsystems which operate in the society are regulated so as to minimise the disturbances to the human environment caused by fluctuations in the natural environment, by outside human agencies or by innovations within the society. For any significant change to take place the innovations must be linked in a deviation-amplifying mutual causal system: the innovation produces effects which favour the further development of the innovation. In some cases the innovation arising in one subsystem has marked effects in other subsystems: this is a feature specifically of human societies with their goal mobility, where needs or aims in one dimension are sublimated to other dimensions. In such a case, if positive feedback occurs, the multiplier effect can come into operation: coupled developments occur in both subsystems, and the innovation is favoured. When the structure of the subsystems is such that marked change can occur in them (for instance when a technological threshold such as the invention of metal casting, or the sowing of grain, can be surmounted) a cultural ‘take-off’ is possible. Most or all of the subsystems of the society will then undergo marked structural change.

The operation of the multiplier effect—of positive feedback situations within *and between* coupled subsystems—produces a ‘revolution’ in the sense intended by Gordon Childe. This applies equally to the Neolithic, Urban and Industrial Revolutions. Each may take a long time to mature, since these are not sudden quantum shifts, but continuous processes of change. But in each case the rate of innovation and the speed of structural change in the society are much faster over a considerable period, which we regard as the duration of the revolution itself.

Of course these 'subsystems' and the 'positive feedback' between them are theoretical constructs, terms which we have ourselves created in order to talk about such changes. But if they lead us to formulate new hypotheses which can be tested in the archaeological record—to posit, for instance, a correlation between one observable factor and another in a given culture—then they are fruitful constructs. A model such as this offers many features as yet unexplored by archaeologists and anthropologists: it might even be capable of sustaining exact and quantitative formulations, were sufficiently comprehensive archaeological data available.

This is the model for culture change which we shall set out to apply in considering the origins of the Minoan-Mycenaean civilisation. First, in Part I, it will be necessary to establish the relevant sequence of cultures, establishing their spatial and temporal relationships. Then it is proposed, always subject to the limitations imposed by the rather fragmentary data, to look at the workings of the several subsystems operating in the Aegean cultures of the time. This survey is undertaken in Part II. And finally, in chapter 21, a preliminary and speculative attempt will be made to see, in terms of the multiplier effect, how far the interactions of these different sections of society can make intelligible to us, and in this sense explain, the processes which led to the formation of Aegean civilisation.

Chapter 4

The Minoan-Mycenaean Civilisation and its Origins

The consideration of civilisation and its origins has so far been in very general terms. We now turn to the specific prehistoric civilisation, the first of Europe, whose origins are our principal concern. The intention now is to outline some of the salient features of Minoan-Mycenaean civilisation, in the light of the previous discussion, before turning to that earlier period, in the third millennium BC, when many of its basic features were determined.

Since Schliemann's discovery of the treasures 'of Agamemnon' in the great Shaft Grave Circle at Mycenae and Sir Arthur Evans's excavation of the Palace 'of Minos' at Knossos, the writings of Homer, Hesiod, and the other classical writers who recalled an age of bronze before their own, have taken on a new reality. Today we have a fairly comprehensive picture, which becomes increasingly well documented through the progress of excavation in Greek lands, of the dazzling civilisations of Minoan Crete and Mycenaean Greece. The precursors of the civilisation of classical Greece by almost a millennium, they shared so many features in common that for some purposes it is legitimate to refer to them together as the Minoan-Mycenaean civilisation.

The monuments of this civilisation do not compare in grandeur with the pyramids of Egypt or the temples of the Olmecs and Maya. Nor were there cities in late bronze age Greece which could in any way rival the scale and the order of the huge settlements in the Indus civilisation or the great Mexican metropolis of Teotihuacan. The greatest edifices of Minoan Crete were the palaces of its rulers, and the *tholos* tombs of its princes. In mainland Greece some of the major acropolis sites were strongholds defended with impressive 'Cyclopean' walls. But both areas lack temples or major centres with monumental architecture.

Writing was used for accounting in most of the palaces (fig. 4.3), and this significant criterion for civilisation is supported by the breathtaking sophistication of some of the finds: the exquisite stone vases from the palace at Zakro, for instance, and the consummate metalwork from Mycenae, as well as the delightful frescoes from several



FIG. 4.1 Man's created environment: prospect of the Northern Entrance Passage of the palace at Knossos (reconstructed by Piet deJong) (*after Evans*).

palace sites, and especially from Knossos. It is clear that the palace dweller lived in a complicated and comfortable physical environment, calling upon a range of developed craft skills for its creation and maintenance. The social relationships documented by the complexity of the palace lay-out and organisation (fig 4.4), and emphasised by the business-like competence of the written records, are most effectively exemplified by the wealth of the palaces and the splendour of the burials. These again testify to the richness of the symbolic environment. For even in the absence of monumental temples, the projective systems were obviously a real and a complicated part of the environment of the civilised Minoan or Mycenaean.

The man-made environment of the Minoans and Mycenaeans, in the palace centres at least, was an elaborate and complex artefact (fig. 4.1), which in terms of the discussion in chapter 1 undoubtedly warrants the honorific title of civilisation. It ranks, among the others mentioned, as one of the great early civilisations of the world.

The homeland of the Minoan civilisation was the Aegean island of Crete. In Crete, even during the third millennium BC, and thus before the emergence of the palace civilisation, the finds are all instantly recognisable as 'Minoan'. That is to say they undoubtedly belong to a single archaeological culture, even though there are some regional variations in types. Minoan contacts overseas were widespread, but only in a few rare cases are sufficient Minoan artefacts found together outside of Crete to suggest the possibility of a 'colony'. Essentially, despite one or two possible island outposts, such as Thera and Kythera, the Minoan civilisation was restricted to Crete.

Cretan culture may first be termed a civilisation with the emergence of the first palaces, around the beginning of the second millennium. Early writing is seen shortly after this time. Minoan civilisation may be said to end with the final collapse of the palace system in Crete in the later twelfth century BC.

The Peloponnese was the leading area of the Mycenaean civilisation. Many of the principal sites, such as Mycenae and Tiryns, are in the Argolid; others, such as Pylos, are in the west. To the north of the isthmus of Corinth lie the regions of Attica and Boeotia, and these areas, together with the large off-shore island of Euboea, have yielded very abundant finds of the culture assemblage designated 'Mycenaean'. Sites with finds of essentially Mycenaean character are common also in Thessaly. The distribution of major Mycenaean sites is seen in fig. 15.6, and that of the built *tholos* tombs characteristic of the Mycenaean (and Minoan) civilisation in fig. 4.2. Finds are less numerous in west-central Greece, although there are important sites in the Ionian islands.

Sites in the Cycladic islands and the eastern Aegean are often designated 'Mycenaean', and certainly the way of life which they indicate was similar to that of the Mycenaean mainland. But the finds are by no means identical, and their resemblance should not be exaggerated.

At several sites in both the west and east Mediterranean, numerous Mycenaean finds have come to light (Stubbings 1951; Taylour 1958). At some of these, notably in Cyprus, finds of Mycenaean type are so rich that it is quite possible to regard such sites as within the area of Mycenaean civilisation. But inevitably the local elements of the culture are

so marked that the assemblage of finds could not be confused with one from Greece itself. It seems most convenient to regard Mycenaean civilisation as an Aegean phenomenon, restricted *sensu stricto* to that region. Sites of Mycenaean character lying outside the primary distribution of the civilisation, like the 'Minoan' sites outside of Crete, should be regarded as outposts.

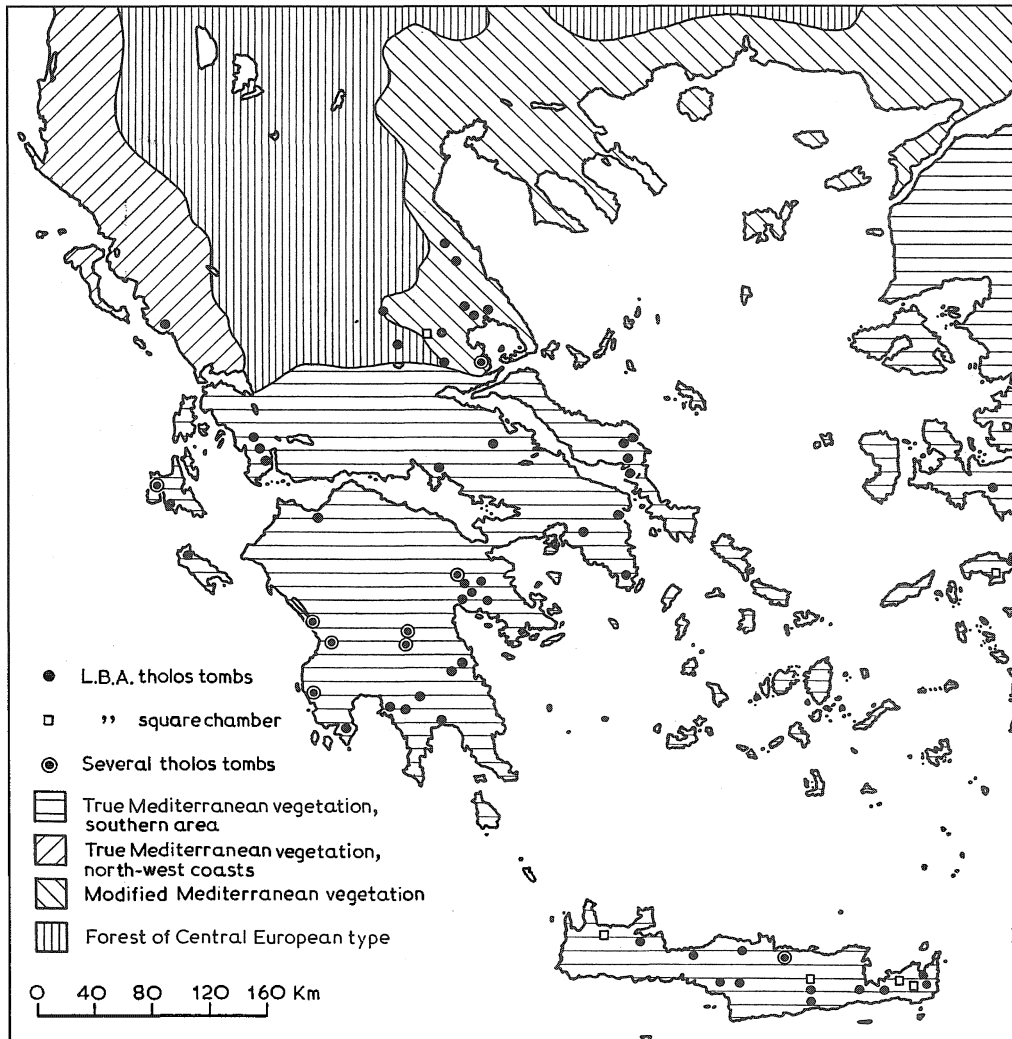


FIG. 4.2 The vegetation zones of Greece and the extent of Minoan-Mycenaean civilisation as documented by the distribution of late bronze age *tholos* tombs.

The beginning of the Mycenaean civilisation has traditionally been set by the rich finds from the Shaft Graves at Mycenae, discovered by Schliemann, and dated around 1600 BC. No palace remains have been excavated from so early a date, and the more impressive *tholos* tombs are considerably later. Nor was writing extensively used on the mainland so early. So it is really the wealth of the finds, and the magnificence of their craftsmanship, which has earned the designation 'civilisation' for the early Mycenaean period. But clearly, on the operative criteria suggested by Kluckhohn, discussed in chapter 1, its use is not merited until the emergence of the palaces and the effective use of writing a couple of centuries later. If we take the enlarged created environment to be the basic and underlying feature shared by all civilisations, the whole new material world which the palace constitutes, and the social world which it reflects, are essential features. In this precise sense, then, we may not call the Mycenaean culture a 'civilisation' until the emergence of the first mainland palaces. Unfortunately it is the later period of the palaces which is best understood, and the date of the first Mycenaean palace remains to be established—it may, of course, go as far back as 1600 BC. And the find of a second, earlier, Shaft Grave circle at Mycenae, in use already by about 1650 BC, might be taken to suggest that a princely dynasty, perhaps with a palace of some kind, was already in occupation of Mycenae by that time. At present it is difficult to decide, using the criteria defined, at just what date Mycenaean culture became 'civilised'. In view of this difficulty and for the sake of convenience, it seems simplest to follow conventional usage and begin the 'Mycenaean Age' around 1600 BC.

The end of the Mycenaean civilisation is again defined by the end of the palaces. There are, however, important Mycenaean sites, such as Lefkandi in Euboea, which flourished during the twelfth century BC, after the destruction of many of the palaces elsewhere. The end of the Mycenaean civilisation may most conveniently be set at the termination of the period classified as Late Helladic III C, around 1100 BC.

The Minoan and Mycenaean civilisations shared many features in common. The palace economy of each was, naturally enough, based upon a similar subsistence pattern and craft technology. And, quite apart from the whole range of Minoan exports to the mainland, it is clear that many customs and artefacts of the mainland, imitated those of Crete. Indeed a distribution map plotted for the finds of many types of artefact found in the one civilisation would extend without discontinuity into the territory of the other. The map for *tholos* tombs (fig. 4.2) is a case in point.

Developmental stages in Aegean prehistory

The process of growth in the Aegean seems essentially to have been a continuous one. Any suggested sequence of stages will thus inevitably be somewhat arbitrary. It does seem worthwhile to draw distinctions, since they emphasise some of the features which now seem important emerging during this process of growth.

I. THE ERA OF HUNTING AND GATHERING

The earliest palaeolithic finds so far known from Greece are Mousterian. Upper Palaeolithic finds come from various regions of the mainland, from Macedonia and Epirus southwards to the Peloponnese. So far there is no evidence for a dramatic climatic change at the end of the Pleistocene period, nor for a striking shift in the subsistence basis or other aspects of the human adaptation, although intensive exploitation of tunny fish is seen at the Franchthi Cave in the Argolid (Jacobsen 1969). Certainly there was no change so marked as that in northern Europe, where the term 'mesolithic' is particularly applicable. There are no phase I finds from Crete or the Aegean islands.

II. INTRODUCTION OF SIMPLE VILLAGE FARMING

From about 6000 BC village farming settlements are found, based on cereal farming supplemented by leguminous crops. As in the Near East sheep and goat formed about 80 per cent of the livestock, with cattle and pig also kept. Present evidence for the distribution of wild prototypes for these domesticates suggests that several important features of this economy were introduced to the Aegean from Anatolia or the Near East. In the north the villages were of open plan, with pisé houses on a timber frame. In Crete the settlement at Knossos was of agglomerate plan. The distribution of obsidian from the Aegean island of Melos suggests considerable freedom of movement at this time. There is, however, no clear evidence that the Aegean islands (other than Crete) were settled during the first millennium of farming settlement in Greece.

III. DIVERSIFICATION IN VILLAGE FARMING PATTERN

Local variations are now seen in the material culture of the various regions of mainland Greece: the Cretan neolithic differed strikingly from that of the mainland from the outset. In northern Greece, especially Thessaly and Macedonia, tell mounds (cf. fig. 15.2) are of frequent occurrence. In the south they are less frequent, and buildings are more often of stone. New plants, such as the fig, are cultivated, and the first utilisation of the vine, and possibly of the olive, dates from this phase. Sparse indications of copper working are seen from a few sites. Dhimini in Thessaly is fortified, and the first extra-mural cemetery is seen at Souphli. The trade in obsidian continues, and marine shell is also traded. The Aegean islands are now fairly widely settled. This phase may be dated very approximately (in radiocarbon years) from c. 5000 BC to c. 2500 BC (c. 3200 BC in calendar years).

IV. DEVELOPMENT OF PROTO-URBAN COMMUNITIES

More complex settlements are now seen in four regions of the Aegean—in southern and east-central Greece, in Crete, in the Cyclades and in north-west Anatolia. The olive and vine are now intensively exploited, and there is a correlation between their distribution and that of the new proto-urban communities (cf. fig. 18.12). Some of these

have stone fortifications, a greater density of settlement and notably large central buildings. Copper and bronze metallurgy are now widespread, and trade has increased. This phase covers approximately the third millennium BC. In regions of the Aegean outside the four mentioned, however, the way of life does not differ very markedly from that of phase II.

V. EMERGENCE OF PALACE ECONOMIES

First in Crete, then in mainland Greece and also in the islands, a centralised organisation emerges, with the palace as focal point. The palace is both the redistributive centre for the economic activities of a region, and the residence of a prince, the leading personage of a society now highly stratified. Craft and technology advance markedly, and in Crete writing is used for records. This is the early phase of the Minoan-Mycenaean civilisation, which begins in Crete by the twentieth century BC and on the mainland in about the sixteenth.

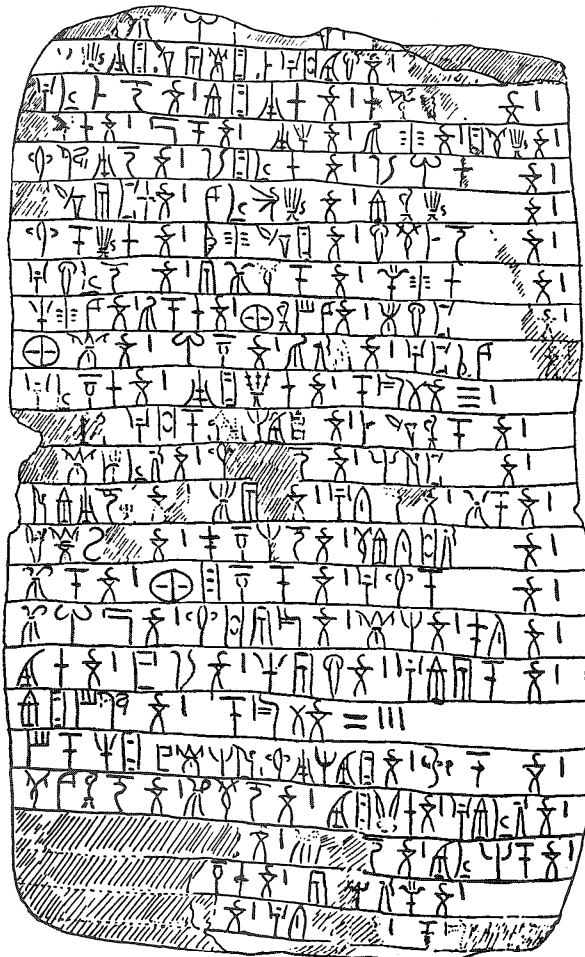


FIG. 4.3 Clay tablet from Knossos, inscribed in the Minoan Linear B script, showing lists of men (after Evans). Length 26 cm.

VI. EXPANSION OF THE MYCENAEAN CIVILISATION

During the fifteenth century BC Crete adopts many Mycenaean customs and artefacts, and the two civilisations have effectively merged. The Minoan overseas trade of the previous phase is soon superseded by a much expanded Mycenaean trade, in both the east and west Mediterranean. Although the material culture of this phase is simply a consolidation of that of the preceding, it seems possible that there are stronger social and even organisational ties, whose detection and interpretation in the material record offer ground for controversy. This phase dates from the mid-fifteenth century to the mid-twelfth century BC.

VII. COLLAPSE OF THE MINOAN-MYCENAEAN CIVILISATION

Many of the important settlements of the Minoan civilisation were destroyed and abandoned around 1200 BC, and very many more sites throughout the region of the civilisation were abandoned during the succeeding century. In particular it is clear that the palace organisation collapsed completely, and with it disappeared such advanced features as the use of writing. Although there was some continuity of occupation in the succeeding 'sub-Mycenaean' period, the Minoan-Mycenaean civilisation had ended.

The significance of the third millennium BC for the emergence of Aegean civilisation

During phase II of the developmental sequence outlined above, the cultures of the Aegean may be described as basic subsistence economies. The settlement pattern was one of straightforward farming villages with no systematic variation in size between them. Within them there is little evidence for social stratification or craft specialisation. There was little variety in the subsistence base—effectively cereals and livestock—and limited variation in craft production. In consequence there was no great need for trade or travel, although the notable exception of Melian obsidian shows that these farmers were already accomplished seafarers.

By phase V, however, the Aegean was the home of a full palace civilisation, with a highly structured economy and social system centred on the palace, and with a wide range of sophisticated craft products, made by a competent technology which included metallurgy. Religious observances required a complex symbolism, which was expressed in a characteristic and sophisticated art style. And trading contacts were established with places as far afield as Egypt and Sicily.

It is the transition between these two culture states, the transformation from simple village subsistence economy to full palace civilisation, which we are trying here to understand. Clearly the key to this transformation lies in the intervening period, phases III and IV of the developmental sequence.

At present, and this may be in part due to our very dim comprehension of phase III, it is phase IV which seems crucial. At its beginning the Aegean was the home of rather isolated communities without the effective use of metal and without any evidence for a developed economic or social structure. It is during phase IV that all these features emerged, so that at its end we see the emergence of palace civilisation in Crete.

The focus of attention in the present study falls therefore upon this phase IV, the third millennium in the Aegean, conventionally termed the 'Early Bronze Age'. An attempt is made to study in detail the changes taking place within the different subsystems of the culture of the time.

The approach here, as the preceding chapters will have made clear, is to favour an explanation in terms of factors working within the cultures, rather than to emphasise the effect of outside influences. But of course the significance of overseas contacts, which were rather numerous, has to be assessed. Most explanations for the origins of Aegean civilisation have in the past emphasised the role of such outside influences. And in order to make the difference between these approaches clear, it seems worthwhile here to outline the argument followed by such explanations. First, however, an important question of interpretation must be clarified.

A problem of terminology

We are faced in the Aegean today with the impressive, steady accumulation of well-documented evidence bearing on various aspects of the prehistoric past. But it is true to say that our understanding of the prehistoric past has not kept pace with the material now available. The reason for this is a relatively simple one: the theoretical framework for the study has changed hardly at all in the half-century that has elapsed since 1918, and the early writings of Evans, Wace and Blegen.

Sir Arthur Evans applied the term 'Minoan' to the culture of bronze age Crete and strictly the word has both a cultural and a geographical sense, referring not only to provenience but to style. The terms Helladic, Cycladic, Troadic, Thessalian (and sometimes Macedonic) are used in an analogous, specialised sense. Evans and Mackenzie, on the basis of the excavations at Knossos, divided the Minoan sequence into three periods (Early, Middle and Late) and each period into three sub-periods (I, II, and III). At the time this was a significant advance and indeed it was followed for a while by Gordon Childe in his classification of the prehistory of central Europe (Danubian I, II, III, etc.).

What Childe effectively realised, however, was the need for separate geographical, chronological and cultural terminologies. The meaning of the term 'culture', discussed in chapter 1, was conveniently defined by Childe as a 'constantly recurring assemblage of artifacts', and nearly all subsequent definitions amount essentially to this. Cultures, in this sense, have extension in space and time: they are not the same as chronological periods.

Evans's periodic system for Crete has certain restrictive properties, and really applies in the first instance to Knossos alone. It is universally accepted, for instance, that Middle Minoan II and Late Minoan II are basically pottery styles, and cannot be taken as chronological divisions with wide validity and general application. Early Minoan III is a term which has often been criticised, representing a meaningful chronological division—if at all—chiefly in east Crete. But, despite these difficulties, Evans's system works in Crete, essentially because the bronze age of Crete as a whole represents the development of a single culture. In other words, the Minoan divisions are sub-periods *within* a single culture, and regional divisions seem of relatively minor importance.

This is not true elsewhere in the Aegean. For mainland Greece the terms Early Helladic I, Early Helladic II and Early Helladic III were first put forward half a century ago by Wace and Blegen (1918) following the lead given in Crete by Evans and Mackenzie. They have recently been re-defined by Caskey (1960a). But the situation in mainland Greece is not really the same as that in Crete, where we see the evolution of a single culture. Early Helladic I, II and III designate distinct assemblages of material, which are in effect cultures, in the well-defined archaeological sense of that term. While in Crete, therefore, Early Minoan II inevitably follows Early Minoan I, there is in mainland Greece nothing absurd in discussing the possibility that the culture characterised by 'sauceboats' and other well-defined features, as seen at Lerna Stratum III ('Early Helladic II'), may continue in some areas while Lerna and other sites in the Argolid are within the area of a new culture with its own distinctive painted wares—the culture of Lerna Stratum IV ('Early Helladic III'). Now if 'Early Helladic II' and 'Early Helladic III' are *periods* it is absurd to suggest they might in part be contemporary: the numerical designation is employed to denote sequence. Equally it is logically possible—and has been suggested—that at some sites the former culture, 'Early Helladic II', and the latter 'Early Helladic III' are actually separated by a different archaeological assemblage. Are we then, for this new material to employ a fractional designation? The same problem is seen in the Cyclades where the Grotta-Pelos culture and the Keros-Syros culture may be in part be contemporary. Nothing is gained by designating them Early Cycladic I and Early Cycladic II.

There is no satisfaction in a system where the suggestion that Early Helladic III follows Early Helladic II seems tautologous, or the claim that Early Helladic III could be largely contemporary with Early Helladic II sounds like nonsense.

I therefore suggest that, following standard archaeological practice, cultural designations be used for the mainland early bronze age. For the 'sauceboat'-using early Helladic II people the name 'Korakou culture' is proposed after Blegen's publication (1921) of a suitable site where in fact the terms Early Helladic I, II, and III were first employed. 'Eutresis culture' is suggested for Early Helladic I after the principal site where it has been found well stratified (Goldman 1931), and it may be taken as defined by groups III to IV of the Caskeys' more recent excavations there. For the Early Helladic III assemblage, as redefined by Caskey (1960a) the term 'Tiryns culture' is proposed after the excavation where such material was first published in quantity (Müller 1938).

None of these is a one-period site, nor does the terminology imply that they were especially important settlements. It simply allows the independent discussion of cultural and chronological problems.

By adopting cultural designations for the various cultures in the different regions of the third millennium Aegean, we are then also free to use period names, Early Bronze 1, Early Bronze 2, Early Bronze 3, which are defined in chapter 13. Their usage is an approximate one, and depends on the whole series of assumptions about cultural relationships in the Aegean which are made explicitly in that chapter. But the basic terminology must refer to the archaeological material, and that is what the cultural designations effectively do.

Alternative theories for the origins of Aegean civilisation

Three fundamentally different theories may be expounded for the origins of Aegean civilisation, and any explanation is likely to rest upon one of these, or some combination of them. The first two are, in different senses of the word, diffusionist. The migrationist view, that the key developments towards civilisation were brought about by the arrival of a new population, is diffusionist in the same sense that Elliot Smith was a diffusionist. The second holds that Aegean civilisation emerged as a result of the stimulating influence of the higher civilisations of the Near East. This influence would have come about through trading contacts, and perhaps also through the activities of prospectors for metal who would have travelled in the Aegean before returning to their Near Eastern homeland. The third theory, following the model set up in the last three chapters, seeks to explain Aegean civilisation as essentially the product of local processes. The factual evidence for contact, upon which these theories may stand or fall, is of course a subject for sober assessment. Here it is the theories themselves which we are seeking to contrast.

The migration theories are always, in Greece, bound up with the question of the origin of the Greek language. The presence of non-Greek place names in Greece well before classical times certainly suggests the earlier presence of a population which did not speak Greek. It is widely assumed that this population, or at least its language, was replaced by Greeks, speaking a Greek language, who entered the country from outside. Some scholars set the 'coming of the Greeks' as late as the beginning of the Mycenaean period around 1600 BC. Some of those who do not accept Ventris's decipherment of the Minoan Linear B script as recording an early form of the Greek language can even set their arrival later than this. Most arrival theories, however, set the date some time during the third millennium BC, during, or at the outset of phase IV as defined above, or in conventional terminology, during the early bronze age.

These theories do not attribute the emergence of Aegean civilisation solely to the arrival of Greek-speakers. But often some of the leading developments of the third millennium are explained in this way—and, as suggested above, these are indeed very relevant to this whole question of development and growth towards Aegean civilisation.

In a now classic article, 'The Coming of the Greeks', Haley and Blegen (1928) presented the distribution of the 'pre-Greek' place names, and suggested that they were the legacy of a population which came to Greece at the beginning of the early bronze age. A decade earlier, Wace and Blegen (1918, 180), on the basis of a study of Aegean early bronze age pottery, had concluded: 'Further exploration and study will probably show that these three divisions, Early Helladic, Early Cycladic and Early Minoan Ware, are all branches of one great parent stock which pursued parallel but more or less independent courses.' Following this argument, it would of course be perfectly reasonable to attribute some of the new features of the period, such as metallurgy perhaps, to the cultural equipment, if not the innate dynamism, of these arrivals.

Following the classic exposition of this theory, a different pottery style, Minyan ware, which is typical of the middle bronze age of the Greek mainland, would indicate the arrival of the Greeks themselves. 'The period of Minyan ware indicates the introduction of a new cultural strain, the origin of which is not yet clear, though some indications point to Phokis and others to the eastern shores of the Aegean as its home.... Though Early Helladic Ware disappeared it need not necessarily mean that the race that made it was extirpated, for it seems inconceivable that a race so numerous and so widespread, to judge merely by the distribution of Early Helladic Ware on the Mainland, could have been obliterated' (Wace and Blegen 1918, 189).

In the half century since those remarks were written, and largely through the researches of its authors, it has become clear the Minyan ware does not have the great significance which it once seemed to possess. But the citation is an important one as indicating a migrationist train of thought, which has been followed by other writers.

The changes occurring in the Aegean at the beginning of the third millennium have been attributed, by different authors, to the arrival of a new population from at least four different directions. It may be worthwhile to highlight here some of the evidence on which these views rest.

(A) IMMIGRANTS FROM THE NORTH

The view that the onset of the Aegean early bronze age was significantly affected by the arrival of immigrants from the north offers the hope of a correlation with the linguistic problems arising from the distribution of the Indo-European languages (Crossland 1967; Gimbutas 1965). But although Mylonas (1959, 27 and fig. 21.2) has compared some forms of the Korakou culture at Aghios Kosmas with those of the Baden culture in the Balkans, and supposedly Balkan cord-impressed pottery has been found at a few sites (Milojčić 1959, 27 and fig. 21.2; Goldman 1931, 122, fig. 169) the theory can explain only a few of the features seen in the Aegean at this time.

(B) IMMIGRANTS FROM THE SOUTH

In the early years of his excavations in Crete, Sir Arthur Evans was impressed by a number of features for which parallels could be found in Egypt and especially in North

Africa. He did not take the view, argued by Elliot Smith, that the Minoan civilisation was the direct result of influences from Egypt. But he did point out that the round tombs of the Mesara in Crete might be comparable with certain round tombs in Libya, and that the penis sheath, seen in Minoan Crete, was also worn in Libya. These possibilities, however, were not greatly emphasised by Evans, and the theory has found few advocates.

(C) IMMIGRANTS FROM THE NEAR EAST

In recent years Weinberg (1965b, 308) has ingeniously proposed that apparent similarities between Aegean early bronze age finds and those of the Ghassul culture of Palestine suggest an immigration from that general area: 'Thus it is possible now, even more than in 1952, to demonstrate the parallelism between the general development in the Aegean, beginning with the Aceramic Neolithic period, and in the Near East. The Aegean was the recipient of repeated waves of migration from Anatolia and Syro-Cilicia in particular, as well as of cultural influences that came independently of actual migrations.' This then is the background, and Weinberg has listed a number of forms in the third millennium Aegean which may be assigned parallels at Ghassul—'bird vases', mat impressions on the base of pots, high pedestal feet for chalices, suspension lugs, clay ladles, pattern-burnish, cheese pots, impressed spirals, contracted burial in cist graves, pithos burial, pyxides, and incised decoration (Weinberg 1954, 95; 1965b, 302). The theory is an interesting one, but a detailed exposition of it might prove more persuasive. At present Weinberg is its chief exponent.

(D) IMMIGRANTS FROM ANATOLIA

Current archaeological opinion favours much more strongly some transfer of population from Anatolia to Greece, Crete and the Islands at the beginning of the early bronze age. The position has been cautiously stated by Caskey (1964a, 36): 'Early in the third millennium a current of new influences seems to have spread from north-western Asia Minor and Macedonia and southward, sporadically and somewhat diluted, into central Greece. About the same time, or perhaps a little earlier a parallel movement must have brought people to the small islands of the Aegean, where Neolithic settlements appear to have been scarce. Crete ... was also affected. Logic suggests that the first Early Helladic occupants of southern Greece itself must likewise have come by way of the islands, but at each step along this path we find the evidence less convincing.'

Emily Vermeule (1964a, 26) writes more positively: 'A variety of movements spread from Anatolia across the Aegean islands.... Crete perhaps received a group of Anatolian sailors, and Anatolians certainly settled the largely unexplored mounds of Macedonia and Thessaly. They were not all the same racial stock ... nor did they speak precisely the same language or make the same objects.'

Gordon Childe who, as we shall see, had his own very persuasive diffusion theory was more cautious (1957a, 66): 'A closer study of the pottery, however, shows that no

one Anatolian culture was reproduced on the European shores. If a migration from Asia Minor be assumed, it will be necessary to postulate several streams with different starting points.... Perhaps, then, the striking agreements could be explained as parallel adjustments of related cultures when visiting merchants and prospectors from the Levant and Nile introduced metallurgical and other techniques....'

The evidence supporting these various migration theories will be reviewed later—at present it is sufficient to bring out the theoretical framework, which is, of course, a rather different one to that adopted in the present work.

A general weakness of the migration hypothesis, however (with the exception of theories placing the origin of the migration in Egypt or the Near East), is that, even accepting that an incursion of people took place, this does not explain how a significant cultural advance came about unless it can be shown that the arrivals possessed in their homeland skills which at that time were lacking in the Aegean. Of course, in fairness, it must be pointed out that in some cases the theory seeks to explain a linguistic change rather than a cultural one. But sometimes there is an implied appeal to innate cultural qualities which the immigrant race or people may have possessed.

The diffusion theory overcomes this weakness, for it does not simply insist that the Aegean cultures were in contact with the inhabitants of other areas. An essential tenet is that the significant and determining contacts were with 'centres of higher culture', and that through these contacts technological and other advances were transmitted to the Aegean. The focus of interest shifts, therefore, from the immediate neighbours of the Aegean to Egypt and the Near East (and specifically Sumer) where the two earliest civilisations of the Mediterranean were developing.

This theory was compellingly propounded by Childe (1936a, 169 f.). He argued that the great irrigation civilisations of Mesopotamia, the Nile and the Indus arose essentially independently. But this theory was not extended to other civilisations of the ancient world. It is here that the diffusion theory emerges: 'But once the new economy had been established in the three primary centres it spread thence to secondary centres, much like Western capitalism spread to colonies and economic dependencies. First on the borders of Egypt, Babylonia and the Indus valley—in Crete and the Greek islands, Syria, Assyria, Iran and Baluchistan—then further afield, on the Greek mainland, the Anatolian plateau, South Russia, we see villages converted into cities and self-sufficing food-producers turning to industrial specialisation and external trade. And the process is repeated in ever widening circles around each secondary and tertiary centre.... The second revolution was obviously propagated by diffusion; the urban economy in the secondary centres was inspired or imposed by the primary foci. And it is easy to show that the process was inevitable.... In one way or another Sumerian trade and the imperialism it inspired were propagating metallurgy and the new economy it implies.... These secondary and tertiary civilisations are not original, but result from the adoption of traditions, ideas and processes received by diffusion from older centres. And every village converted into a city by the spread became at once a new centre of infection.'

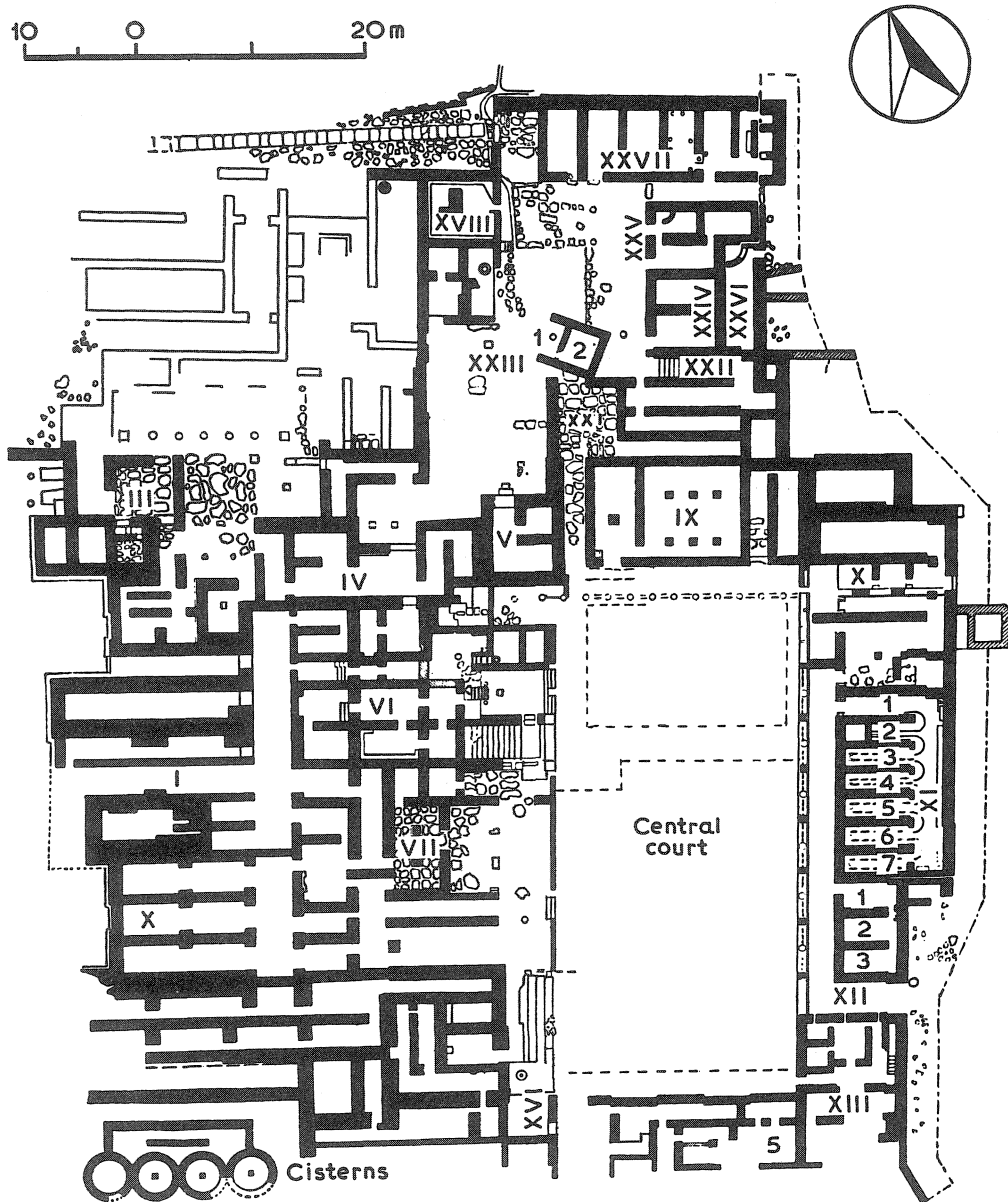


FIG. 4.4 The Middle Minoan palace at Mallia (with later additions)
(after Marinatos and Hirmer).

Childe's very persuasive model for the dissemination of civilisation has been adopted by most of those considering the origins of the Minoan-Mycenaean civilisation. It is not, however, accepted here, since, as we shall see in chapter 20, the evidence for it does not appear convincing. The model outlined in chapter 3 is intended as an alternative to that proposed by Childe, although it may not have all the latter's compelling simplicity. Childe's theory gives the clearest available expression of the diffusionist case, an explanation which would be accepted in outline by most of those who feel that the migration of people may also have played some role in this process.

This brief survey of some of the principal features of the Minoan-Mycenaean civilisation, and the explanations that have been adduced to account for its early origins, concludes the introductory section of this book. In Part I, which follows, the material and especially the culture sequence for the different regions of the Aegean during phase IV, in the third millennium BC, will be discussed. As explained above, this was the crucial phase for the emergence of Aegean civilisation, and the solution to many of these problems must depend upon the assessment which is made of it. In Part II the various subsystems of the culture, as defined in chapter 2, are considered in turn, and an effort is made to see how their growth and interactions brought about the emergence of Minoan-Mycenaean civilisation.

PART I

Culture Sequence



2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453
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The term 'mesolithic' is here avoided, being best applied to regions where the neothermal climatic changes had very marked ecological effects, transforming the subsistence patterns of the inhabitants. In the Old World, this may be seen in northern Europe, but the evidence for such a change is less marked in the Mediterranean region. At the Franchthi Cave in the Argolid an apparently continuous transition from the Upper Palaeolithic period to neothermal times has been observed in the stratigraphy (Jacobsen 1969). Before the first domestic animals, sheep and goat, appear in the record, red deer is the dominant faunal species. Sometime before 7000 BC, in radiocarbon

years, fishing became important, and at this period obsidian was obtained from the Cycladic island of Melos. By about 7000 BC abundant sheep and goat remains, presumably domestic, are found, although without pottery. This apparently aceramic neolithic phase is overlain by deposits with early neolithic pottery which appears by about 5800 BC. Early neolithic finds have been reported also from Thessaly, notably, at the site of Voivi (Theochares 1967).

An aceramic neolithic phase in mainland Greece is now attested also at Argissa Maghoulia (Milojčić, Boessneck and Hopf 1962) and several other Thessalian sites including Souphli, and Sesklo (Theochares 1958; 1967). In each case, however, the excavated area is rather small and it is conceivable that pottery was already used in small quantities at some of these sites (Rodden 1970). The lowest level at neolithic Knossos with a date of 6100 BC (BM.124) is likewise without pottery. The grains from this site include emmer, naked hexaploid wheat, hulled barley and lentils (Evans 1964a, 140; 1968) to which can be added einkorn, millet, oats, vetch, peas and acorns for the corresponding Thessalian finds (J. M. Renfrew 1966). Domestic sheep, goat, cow and pig were kept at Argissa, as well as wild animals, and the same domesticates occur at Knossos. The rather similar proportions of these species at Nea Nikomedeia, which also resemble those seen later at Saliagos and Sitagroi, suggest that the relative importance of these animals may not have changed very significantly between the early neolithic period and the present.

The earliest dated pottery in Greece comes from Nea Nikomedeia in Macedonia with radiocarbon dates between 6200 and 5300 BC for the early levels. The red-on-white painted ware and indeed some of the small objects resemble finds in Anatolia (Rodden 1965), while the impressed ware and white painted ware has parallels in the Balkans. At present it seems safest to assume the arrival of the earliest farmers with their domestic sheep and goats and their domesticated cereals, emigrants from Anatolia. Similar finds have been made in Thessaly—the Proto-Sesklo culture. Further south it seems that there may be no painted pottery in the earliest phases, but in general the finds are similar to those of Thessaly. The houses at Nea Nikomedeia were rectangular in plan, between 8 and 11 m in length, built of posts and plastered pisé mud. As Rodden has pointed out, the open plan contrasts with early neolithic sites in Anatolia and compares rather with neolithic sites in Yugoslavia, Romania and Bulgaria (fig. 5.1).

In Crete the earliest date for the pottery neolithic levels is 5620 BC (BM.272). The Cretan neolithic pottery is quite different from that of mainland Greece. Copper ores are already found in these early levels, and a curiosity is the baked mud brick used in house construction, together with the unbaked pisé or *tauf* (plastered mud) which was elsewhere more usual.

No early neolithic finds are known yet in regions of north Greece east of Nea Nikomedeia, or from west Anatolia. Only at the Aghio Gala cave on the off-shore island of Chios have finds been made which may date from this time (Furness 1956). Although no early neolithic finds have been made in the Cyclades, the island of Melos was certainly already being visited for its obsidian, which reached the Franchthi Cave

before neolithic times, and Thessaly and Crete from the very beginning of the neolithic period.

The neolithic occupation of Greece had thus begun by about 6000 BC, and using Weinberg's convenient classification (and his radiocarbon dates for Elateia) the end of the early neolithic period may be set perhaps a little before 5000 BC (radiocarbon years).

Diversification in village farming pattern: the middle and late neolithic

The classic neolithic sequence in the Aegean is that of Thessaly, first established by Tsountas and conveniently revised by Milošević, on the basis of his recent excavations (Tsountas 1908; Milošević 1959). Tsountas's Thessalian A, now termed the Sesklo culture, begins the middle neolithic of Thessaly. Although some authors have argued that a change of population took place at this time, there are elements of continuity in the pottery and figurines, and reservations are permissible concerning the suggested Anatolian or Near Eastern influences. In southern Greece the attractively painted 'neolithic Urfinis' ware is common at sites like Franchthi, Hagiorgitika and Lerna, while in central Greece, at Elateia, the Proto-Sesklo tradition continues with some changes.

Towards the end of this period at Elateia and Corinth a new class of black-burnished pottery emerges, and with it appear the first arrowheads, and some curious four-legged vessels which are of great interest (Weinberg 1962). Very closely similar forms—and the shape is an odd one—have been found at sites of the Kakanj and Danilo cultures of Yugoslavia, and some contact between the two areas is likely.

At this time the village settlements, in Thessaly at least, were still on the open plan with separate house units. The houses were either square (as at Tsangli and Otsaki), or rectangular (as at Sesklo) and up to 20 m long.

The nature of the middle neolithic in north Greece has been clarified by the excavations at Sitagroi in east Macedonia. The first phase there has resemblances with the Vesselinovo culture of Bulgaria. Paradimi, further east in Thrace, has finds in its earlier levels which may be equated with the first and second phases at Sitagroi, including 'black topped' ware. Whether the similarities between the Sitagroi and Bulgarian finds at this time can be explained by Aegean 'influence' on the Balkans or vice versa, or perhaps Anatolian influence on them both, remains to be established.

The middle neolithic of Crete shows almost complete continuity with the preceding phases, to the extent that a quantitative analysis was needed to distinguish effectively between them (Evans 1964a, 203). The only clear contact with the remainder of the Aegean is established by the continuing presence of Melian obsidian.

The middle neolithic of west Anatolia is very little understood. The only well-stratified settlement is at Emborio in Chios: the succession there is discussed in the next section.

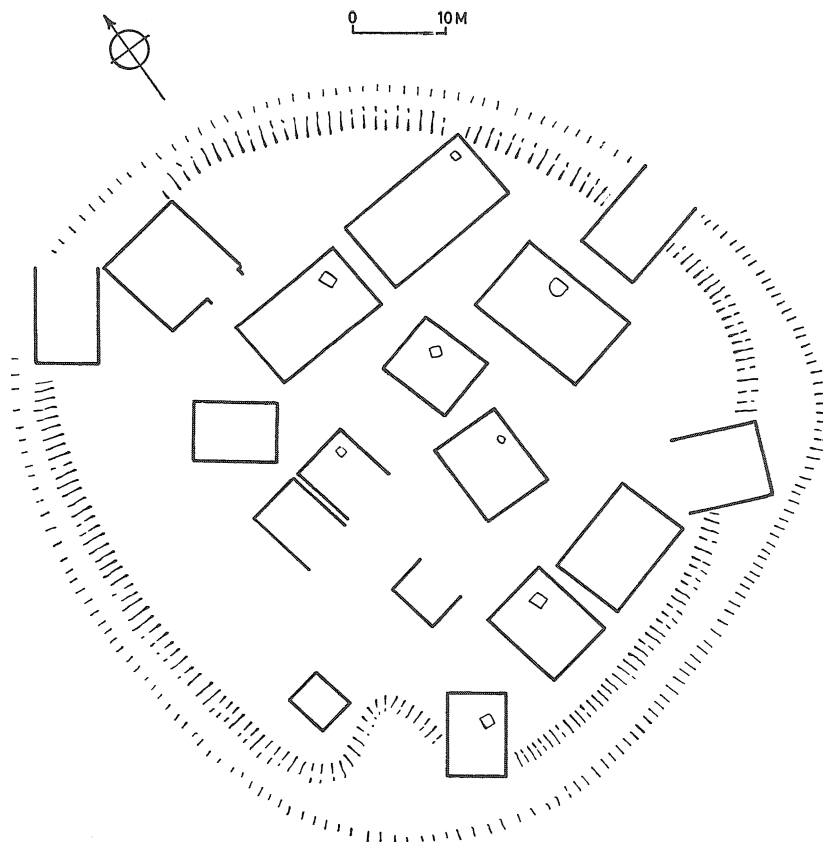


FIG. 5.1 Complete village plan of the later neolithic period. The Gumelnitsa culture site of Căscioarele in Romania, showing houses, in some cases with interior hearths. Later neolithic tell villages of north Greece were rather similar (*after Dumitrescu*).

The Cycladic islands were occupied during the later part, at least, of the middle neolithic period. Finds of the Saliagos culture have been made at the type site, and at Vouni, both in Antiparos (Evans and Renfrew 1968), at Mavrispilia in Mykonos (Belmont and Renfrew 1964) and at Agrilia in Melos (Renfrew 1965, 34). The culture is quite distinct from the other cultures of the period, although there are similarities with the later middle neolithic finds at Elateia. Radiocarbon dates set its duration between 4200 BC and 3700 BC. There is thus an overlap both with the Early Neolithic II of Knossos (3730 BC: BM.279) and the late neolithic Dhimini culture of Thessaly (3680 BC, cf. Milošević in Germana 1961, 446). This is not so much an inconsistency as an illustration of the arbitrary nature of the division into 'early' 'middle' and 'late'. These terms are used only for convenience and do not imply any very strict contemporaneity between areas.

The middle neolithic period may be said to cover, very approximately, in radiocarbon years, the fifth millennium BC.

By common consent the Dhimini culture, Tsountas's Thessalian B, has long been taken to mark the late neolithic period. The classic Dhimini pottery itself, as Weinberg rightly points out, has held an exaggerated importance in the literature. Its bi- and trichrome spirals were at first thought to indicate some contact with the Danubian lands—for example with the Petrești and Ariusd cultures of Romania. In fact it is limited in its distribution, and its local origins and development have been made abundantly clear in Miložčić's recent excavations (1959). Quite which phase of the culture is dated by the radiocarbon determination quoted above has not been stated.

But the radiocarbon dates for the early bronze age Eutresis culture at Eutresis itself, 2492 BC (P.307) and 2496 BC (P.306), which like all the others may be much earlier in calendar years, suggest a much longer duration for this neolithic phase than is usually admitted. Since in Thessaly and Macedonia there is evidence for at least two culture phases in the later neolithic, it is proposed here to follow the implications of Miložčić's excavations and to divide this rather long period into an earlier ('late neolithic') and a later ('final neolithic') phase. The term 'final neolithic', an improvement on a previous suggestion, 'latest neolithic' (Renfrew 1964, 119), has been proposed by Mr Bill Phelps on the basis of his study of the neolithic of southern Greece (oral communication, July 1968).

The late neolithic, whose duration may be set from c. 4000 BC or a little later (in radiocarbon years on the 5568 half-life) to around 3300 BC or a little later, is represented by matt-painted or polychrome wares over much of mainland Greece. Miložčić has shown that in eastern Thessaly these make their appearance before the classical Dhimini pottery with its elaborately painted spirals. He has divided this late neolithic period into four sub-phases. The best account of this period is still that given by Tsountas, and his finds reveal a very different settlement plan from the well-spaced rectangular houses of Nea Nikomedeia or the square houses of Tsangli (Wace and Thompson 1912, 115). The most important site of this period is Dhimini itself. With its circle of defensive walls (fig. 18.13, 1), its spacious courtyard and its megaron house, it represents a notable development. Indeed it seems that in the late neolithic period there may have been some general shift away from the open settlement plan.

The new matt-painted (i.e. lustreless) pottery is now widely found, together with polychrome ware. Weinberg seeks to explain the change in decorative style by influence from the Ubaid culture of Mesopotamia, but the arguments have not yet been presented in sufficient detail to carry conviction. Likewise there seems little need to derive the spiral decoration of Dhimini pottery from the Cyclades (Weinberg 1965a, 47), a suggestion certainly not compatible with the chronology put forward here.

In north Greece at this time, the long stratigraphy at Sitagroi (which is discussed in the next section) together with the radiocarbon dates suggest that the later part of Stratum II there and the earlier part of Stratum III belong to the late neolithic period.

There is little in the Cretan neolithic record to allow precise equation with other Aegean finds. Following the radiocarbon date of 3730 BC for the Knossian Early Neolithic II phase, Stratum IV, we may suggest that this, together with Stratum III and possibly Stratum II (Knossian Middle Neolithic) be equated with this phase.

In west Anatolia and the offshore islands, several of the finds described by Dr Furness (1956) belong to this time. Certainly one or more of the phases at Emborio (discussed below)—perhaps Stratum VIII—must do so. In the Cyclades, as we have seen, the Saliagos culture was well still under way at the beginning of this period. As at Dhimini a settlement enclosure was found at Saliagos rather than the open plan arrangement. Of its immediate successor we know nothing.

The final neolithic

The final neolithic period of Greece is generally not well represented in the great tell sites, since often, as at Lerna or Knossos, these were levelled off during the early bronze age period. For this reason it has been possible to cast doubt on the stratigraphic reality of the Larissa and Rachmani phases of Thessaly which fall at this time, on the sub-neolithic of Crete and on other materials which can now be ascribed to this distinct phase. Without the evidence of radiocarbon dating it could be argued, as Weinberg does (1965a and b) that the late neolithic was of short duration, followed directly by the early bronze age. But the emerging pattern of radiocarbon dates, and recent excavations, present evidence for a period dating from c. 3300 BC to c. 2500 BC in radiocarbon years. Until very recently there has been a gap in the Aegean radiocarbon dates at the fourth millennium BC but this gap is being filled, as it becomes clear that there were at that time prehistoric cultures in every region of the Aegean, of which we know as yet rather little.

Excavations in recent years at five sites do give further evidence for the reality of this period. At Emborio in Chios and Sitagroi in east Macedonia there is a long transition from neolithic to early bronze age. At Eutresis recent excavations have yielded clear evidence for a phase preceding 'Early Helladic 1'. And Milošević's work at Otzaki in Thessaly points in the same direction. And finally, in the Cyclades, Professor Caskey's excavations at Kephala give a homogeneous assemblage—no problems of stratigraphy arise—which has links both with the Grotta-Pelos culture of the Cycladic early bronze age and the final neolithic of Sesklo and Attica.

At present then it seems likely that the duration of the final neolithic period, expressed in radiocarbon years, is from c. 3300 BC to c. 2500 BC. In calendar years this should give an approximate duration of c. 4100 BC to c. 3200 BC. It was a time of considerable cultural diversity in the Aegean.

THESSALY

Much of the material classed by Tsountas in his period 3 (bronze age) succeeding the Dhimini period cannot today be regarded as bronze age in date. This applies to his $\Gamma 1\alpha$ and $\Gamma 1\beta$ ceramic styles. At Rachmani, Wace and Thompson distinguished a stratum with crusted ware between the Dhimini and bronze age strata (1912, 31). At Larissa

Grundmann excavated a group of black burnished pottery whose close position has been clarified by Miložčić's excavations at Otzaki (Miložčić 1959, 24). That this does represent a distinct chronological phase is confirmed by the cemetery at Souphli (Biesantz 1959, 70), where several vessels were found, none of them like those of the Dhimini period.

In general the signs so far are scanty although they are sufficient to corroborate the view of Miložčić rather than that of Weinberg, who would prefer to conflate the late and final neolithic phases, allowing them to overlap with the early bronze age. At Rachmani, however, one house, House Q, of apsidal form, gave a complete assemblage of finds, including abundant pottery with crusted-paint decoration (Wace and Thompson 1912, 31–34; 37–40; 43, 53). These offer an entirely different impression from the finds of the preceding Dhimini period, and different again from those of the early bronze age. House Q at Rachmani has yielded the most convincing assemblage available of the Thessalian final neolithic.

SOUTH GREECE

The neolithic of southern Greece is at present being studied by Mr W. Phelps. It will be sufficient therefore to mention three sites important at this time for their Aegean connections.

Eutresis, first excavated by Miss Goldman, in 1924–27, was re-excavated in 1958 by Professor J. L. Caskey and Mrs Elizabeth Caskey. The pottery found was divided into groups of which I and II precede the early bronze age levels, groups III and IV are assigned to the Eutresis culture (Early Helladic I) and groups VI to VIII to the Korakou culture (Early Helladic II). Group II in particular contained a heavy slipped and burnished ware not known in the late neolithic period (Caskey and Caskey, 1960, 134). We shall see below that this can be compared to both Kum Tepe Ib finds and the Grotta-Pelos finds of the Cyclades. It may be set, therefore, towards the end of the final neolithic.

Secondly, the pattern-burnished ware found at Aegina must be mentioned. Unfortunately, very little of the early material from Aegina has been preserved, and Welter's finds were notably ill-published. It has not been possible to reconstruct shapes—the published reconstructions must be viewed with suspicion (Welter 1938). But in fabric and style the material resembles the finds from Kephala in Kea, which are described below. Recently at Velatouri near Thorikos in eastern Attica, an important deposit of final neolithic material has been found, with pattern-burnish ware closely resembling that of Aegina and Kephala (Servais 1965, 24–27). Among the forms open bowls again predominate.

Finally, there are important finds excavated in the Agora in Athens, which are under study by Mrs Sarah Immerwahr. They are likewise analogous to the finds from Kephala in Kea. They include pattern-burnish ware, 'coal-scuttle' fragments comparable to the Sesklo coal-scuttle (Tsountas 1908, pl. 16, lower) and a clay figurine head with tilted

face. A rock-cut shaft tomb at the Athens Agora (fig. 7.6; Shear 1936, fig. 18) contained a bowl on a ring foot which resembles a find from Kephala (Caskey 1964b, pl. 47, f.). The close resemblances suggest that we may speak of an Attica-Kephala culture during the final neolithic. The mainland finds of this culture are at present scanty, but the impressive assemblage at Kephala itself establishes its identity and homogeneity.

NORTH GREECE

The long duration of the later neolithic of Greece, and the reality of this final neolithic period, have been clearly documented by the finds at Sitagroi in east Macedonia. The stratigraphic succession there is a very long one, extending through a depth of deposits of nearly 11 m.

The lowest levels, which have finds resembling the Vesselinovo culture of Bulgaria are of middle neolithic date, since occupation began around 4600 BC in radiocarbon years. In Stratum II are dark-on-light painted wares which suggest comparison with later Sesklo and Dhimini pottery of Thessaly. Stratum II belongs to the earlier part of the late neolithic period.

Stratum III at Sitagroi contains two painted ceramic fabrics—black-on-red, and graphite-painted wares. The graphite-painted pottery very closely resembles finds of the Maritsa and Gumelnitsa cultures of Bulgaria and Romania. In both areas we see the same pottery shapes and the same curvilinear decoration. The numerous terracotta figurines and some of the small objects, such as terracotta furniture, support the connection. The abundant finds of bracelets of the shell *Spondylus gaederopus* suggest that this may have been one of the key supply points for the Balkan *Spondylus* trade. Small objects of smelted copper are frequent, and a gold bead was found. There was, of course, a flourishing metallurgy in the Balkans by this time. The stratigraphy and the radiocarbon dates indicate that the occupation of Stratum III began during the late neolithic period (well before 3300 BC in radiocarbon years) and continued into the final neolithic. At present it is not certain whether or not there may have been a break in occupation at the end of Stratum III. But the elements of continuity which exist between these finds and those of Stratum IV above seem rather to argue against a hiatus.

The pottery of Stratum IV is very different in character, being entirely without painted decoration. It is dark and well burnished, and occasionally with a little grooved decoration. The most striking form is the shallow bowl with high handle which is seen in Early Thessalian I (Milojčić 1959, fig. 21.11–13). The shape is seen already, although in a painted fabric, in the Thessalian final neolithic (Wace and Thompson 1912, 33, fig. 14). Radiocarbon dates for Stratum IV of 2440 BC and 2360 BC (BM.773 and 782) set it towards the end of the final neolithic and at the beginning of the early bronze age, broadly contemporary with the Eutresis culture of southern Greece but earlier than Troy I.

The final neolithic of east Macedonia thus covers the transition from a typically 'chalcolithic' culture, with painted pottery and numerous figurines, to a rather more sober

assemblage, with plain burnished pottery, which seems to herald the early bronze age of this region.

CRETE

The clearing of the tell mounds at Knossos and Phaistos at the beginning of the First Palace period (Middle Minoan I) severely truncated the earlier succession there. For this reason Early Minoan levels are rather poorly represented at Knossos, and Doro Levi, on the basis of his Phaistos findings, has been able to deny altogether the existence of an Early Minoan period (Levi 1964a; 1964b).

There is evidence to suggest that the latest neolithic deposits were likewise disturbed. The 'sub-neolithic' material, found elsewhere in Crete, has often been considered merely an impoverished contemporary of Early Minoan I. But I have argued elsewhere (1964, 118) that this is an assumption which unwarrantably establishes a hiatus between the Early Minoan and its neolithic predecessor: most of the so-called 'sub-neolithic' material would be better described as final neolithic in the sense established here.

I would like to suggest, therefore, that Stratum I at Knossos (Evans 1964a, 225) (Knossian Late Neolithic), the neolithic strata with painted ware at Phaistos (Levi 1958a, fig. 202) and the 'sub-neolithic' finds from Partira, the Eileithyia Cave and Phournoi (Renfrew 1964, 118), be together assigned to this at present hypothetical final neolithic.

While at Eileithyia there is also painted ware of the Early Minoan I and Early Minoan II periods, at Partira there is absolutely none, and this deposit may then be considered a pure one. The suggestion, therefore, is that these 'sub-neolithic' (i.e. final neolithic) deposits bridge the gap between the late neolithic deposits of Knossos and especially Phaistos and the Early Minoan I finds such as those of Lebena or the Early Minoan I well at Knossos. Two Eileithyia vases (Renfrew 1964, pl. E', 1) compare with finds from the neolithic deposit of Corridoio VII3 at Phaistos (Levi 1958a, fig. 196 and 167), so that the finds in the Eileithyia Cave do indeed reach back to the later neolithic as well as forward to the early bronze age.

The principal forms of this Cretan final neolithic are the two-handled jar (Renfrew 1964, pl. E', 3, 1) which may be regarded as a prototype for the Early Minoan I shape (Alexiou 1960, fig. 20; Xanthoudides 191, fig. 6); the bowl with high horn handles (Renfrew 1964, pl. E', 4, 1); the suspension pot with lid (Renfrew 1964, pl. E', 3, 2) and the bowl, sometimes on a ring base (Renfrew 1964, pl. E', 4, 3) or with a small spout. Thumb grip handles are also seen, intermediate perhaps between the neolithic examples at Phaistos (Levi 1958a, fig. 196) and those still found in Early Minoan I (Alexiou 1951, pl. IΔ', fig. 1; Xanthoudides 1918, 153, fig. 10.81). There is a prototype also for the Early Minoan handled cup (Renfrew 1964, pl. E', 4, 2). Although it would be possible still to interpret these similarities as indications of contemporaneity, it seems preferable to see them rather as demonstrating continuity.

There is from Crete so far only a single radiocarbon date from the period of the final neolithic, of 2550 BC (Sa 241). The sample is from an unspecified cave with 'late neo-

lithic' sherds. However, the date of 3730 BC (BM.279) from the late neolithic Stratum IV at Knossos reminds us that Stratum I there, and possibly Stratum II also, must fall within the span of the Aegean final neolithic.

EASTERN AEGEAN

Many 'late neolithic' finds have been made in Samos, Kalimnos, Chios and other islands of the eastern Aegean (Furness 1956). Although not well stratified, much of this material may fall within the span of the Aegean final neolithic, as also the finds from Beşikatepe.

At Kum Tepe also in the Troad, pottery was found clearly earlier than that of Troy I (Koşay and Sperling 1936). This does not in itself determine a final neolithic date, since the first settlement at Troy may not have begun so early as the Eutresis culture (Early Helladic I) or Early Minoan I. But it seems likely that Kum Tepe was occupied already in the later part of the final neolithic period.

The same observations hold for the site of Poliochni in Lemnos (Brea 1964, pl. I to VIII). The finds of the 'blue' period there are generally set contemporary with the early phases of Troy I, so that the preceding 'black' period should then antedate Troy. The finds from this period may be contemporary in part with those of Stratum IV at Sitagroi, although there is no great resemblance between the finds from these two sites. They fall towards the end of the final neolithic period.

Radiocarbon dates from Beycesultan are relevant here: there is a date of 3014 BC (P-298) for Late Chalcolithic I there (Beycesultan xxxvi) and of 2740 BC (P-297) for Late Chalcolithic III (Beycesultan xxviii). The second of these dates, for Late Chalcolithic III, should be prior to the Late Chalcolithic IV, set by Mellaart as contemporary with Kum Tepe Ib and Poliochni 'black' (Lloyd and Mellaart 1962, 112). On this basis most of the Beycesultan 'Late Chalcolithic' would be contemporary with our Aegean final neolithic. Mellaart (1970) has recently modified his original views, but these relationships seem plausible ones. They would lead us to set the beginning of Poliochni 'black' and of Kum Tepe around 3600–3500 BC in calendar years.

The key site for the eastern Aegean at this period is Emborio in Chios (Hood 1965a). The long stratigraphy at this site, as yet incompletely published, gives a full record for the later neolithic and early bronze age development, much as does Sitagroi in east Macedonia.

The lower strata, X and IX, have points of similarity with the finds from the Aghio Gala cave in Chios (Furness 1956) on the one hand, and possibly with Saliagos (Evans and Renfrew 1968, 90) in Antiparos on the other. Most of the pottery is plain and smooth: the bowls have rims with a thin profile. Writing in 1965 it was possible to suggest a date of about 4500 BC (in radiocarbon years) for the beginning of Emborio X (Renfrew 1965, fig. 13). The Saliagos radiocarbon dates serve to support this view (Evans and Renfrew 1968, 90), which would put Emborio strata X and IX in the later part of the middle neolithic period of the Aegean. Emborio Stratum VIII apparently follows

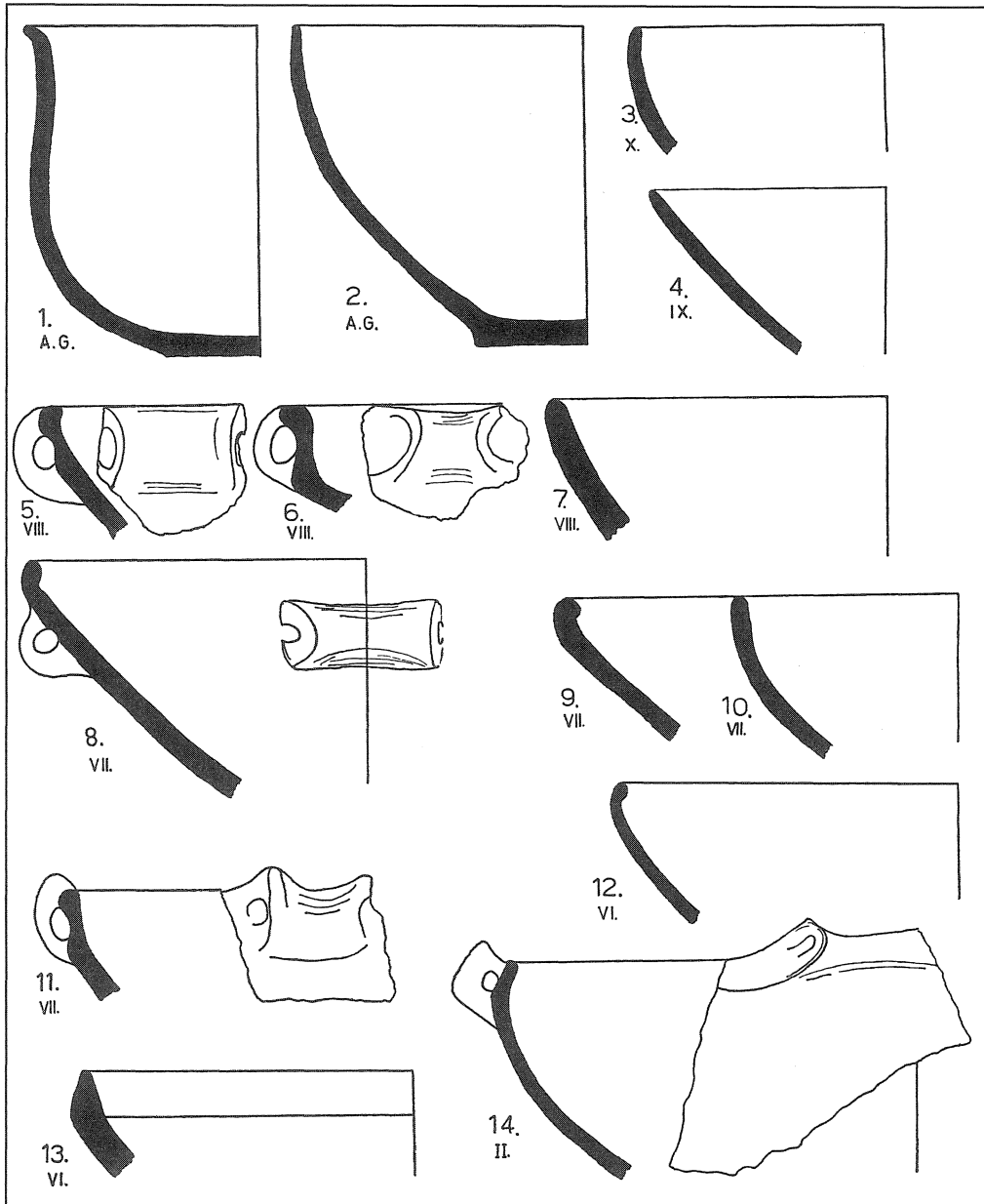


FIG. 5.2 The evolution of the burnished bowl in Chios. The Roman numeral signifies the phase at Emborio; A.G. indicates Aghio Gala. Scale c. 2 : 5.

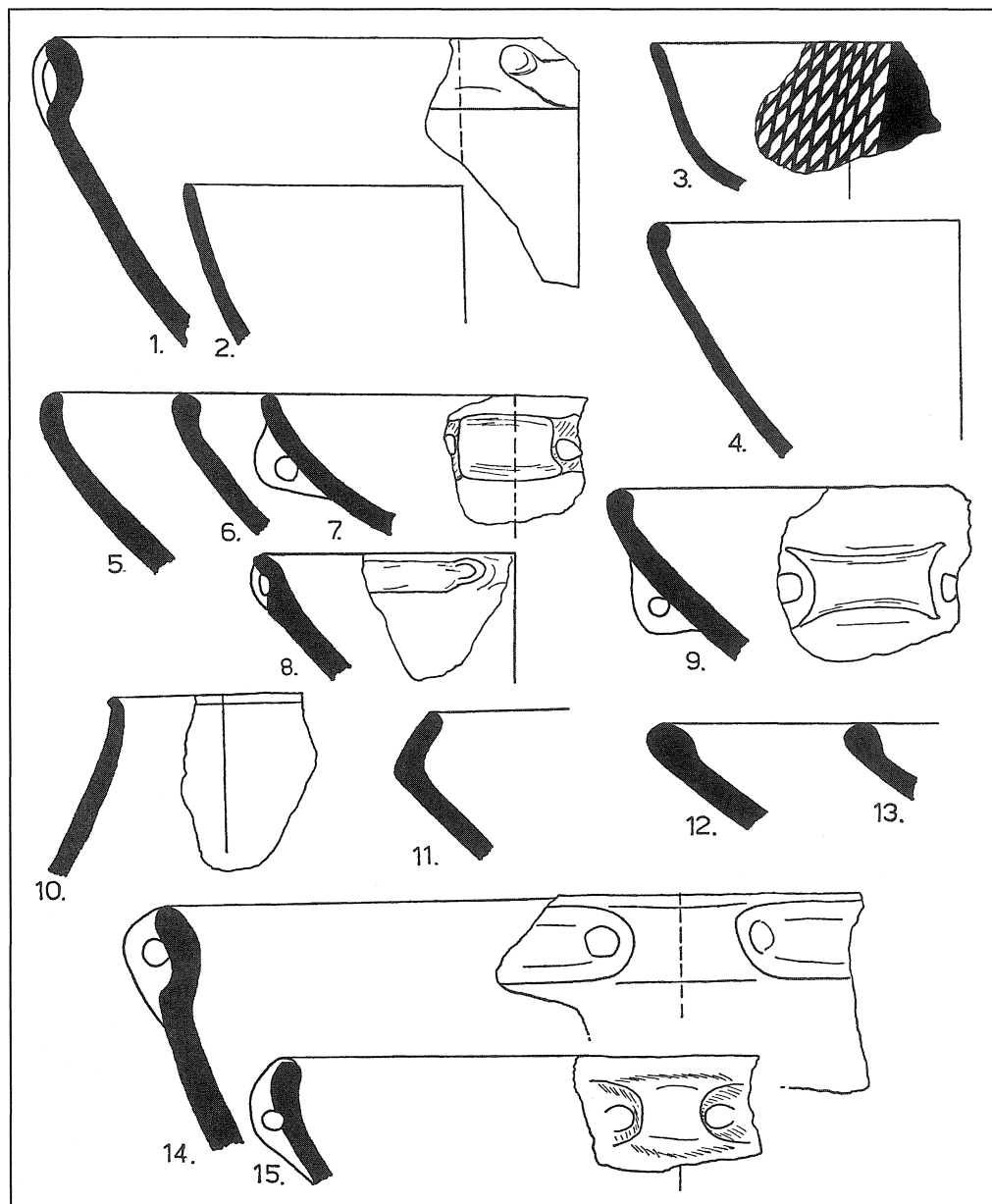


FIG. 5.3 Aegean later neolithic bowls, no. 3 pattern-burnished. 1-4, Kum Tepe Ia; 5-10, Kum Tepe Ib; 11, Kum Tepe Ic; 12-13, Lerna II; 14-15, Poliochni I. Scale c. 2 : 5.

without discontinuity upon Stratum IX. The incised ware first seen in Stratum IX remains popular, and a black pattern burnish fabric is now common. This phase must belong in the late neolithic period of the Aegean, as here defined.

The assemblage of Emborio VII and VI shows features, especially in the bowls, which relate it closely with Kum Tepe Ib and with Poliochni. As discussed in chapter 10 the rolled rims are a common feature of most of these bowls, although there are differences in the shape and position of the tubular lug handles. In Stratum VII the black pattern burnish ware is less common, but a separate and distinct red fabric is seen. Strata V and IV at Emborio may be equated with the Troy I culture. A new, rather heavy, incised style is seen, which has been likened to that of the Troy I period at Poliochni. It finds resemblances also in the Yortan culture and in Aegina. Numerous copper (or bronze) objects are now found. There is a radiocarbon date of 2025 BC (P-273) for the destruction level of Stratum IV, the equivalent of a date in calendar years of about 2550 BC.

A fuller consideration of the Emborio finds must await the publication of the material. But already it is clear that strata VII and VI are to be assigned to the Aegean final neolithic. They relate to Kum Tepe Ia and Ib, and Poliochni 'black'. Perhaps the most exciting feature of the site is that the final neolithic culture there seems to develop steadily and without interruption from middle and late neolithic predecessors, so that the evolution of the final neolithic of the eastern Aegean is clarified.

THE CYCLADES

The middle-to-late neolithic Saliagos culture had no obvious immediate successor yet recognised from the archaeological record. But two culture groups may be discerned in the final neolithic. One of these, the Grotta-Pelos culture, continues without interruption into the Early Bronze I phase in the Aegean. Its domestic pottery shows close similarities with the Kum Tepe Ib finds, and with some of those of Emborio VII and VI. Despite these final neolithic origins, the Grotta-Pelos finds are discussed in chapter 10.

The second culture group in the Cyclades takes its name from the site of Kephala (Caskey 1964b). A rather poorly preserved settlement on the headland there yielded pottery, indications of metal smelting and a radiocarbon date of 2876 BC (P-1280), corresponding to a calibrated date of c. 3500 BC. The Attic-Kephala culture, probably contemporary in part with the early Grotta-Pelos culture, belongs to the Aegean final neolithic.

The most important and exciting find at Kephala was the cemetery of small built graves. They were circular or rectangular in shape, consisting of small flat stones, and containing several burials each, as well as a few grave goods. Some pithos burials of children were also found in the cemetery. Amongst the grave goods were several establishing so close a contact with certain sites in Attica that the term Attic-Kephala culture has been proposed for this assemblage (Renfrew 1965). The most important of these is the pattern burnished pottery, which is of red fabric, with the burnished and

non-burnished lines of approximately equal width (Caskey 1964b, pl. 47, h and i). This distinctive style is seen also at Aegina and Velatouri near Thorikos (Servais 1965, 24–27) as well as Prosymna (Blegen 1937, fig. 635), Corinth (Robinson and Weinberg 1960, 250) and Askitario (Theochaes 1954a) and the Agora at Athens. A further link with Athens is provided both by fragments there of the ‘coal-scuttle’ vessel seen at Kephala (Caskey 1946b, pl. 46, e and f) and by the characteristic figurine heads of clay (Caskey 1964b, pl. 46, c and d) with prominent noses. A similar ‘coal-scuttle’ was found also in the final neolithic levels at Sesklo (Tsountas 1908, pl. 16, lower).

The Attic-Kephala culture, like the Attic-Cycladic Mischkultur of the early bronze age is restricted to Attica, Euboia and the north-western Cyclades. It clearly belongs to the final neolithic of the Aegean.

On the basis of the relationships noted, and of the radiocarbon dates, a simplified chronological table may tentatively be proposed to clarify the position of the final neolithic cultures in the various regions of the Aegean (Table 5. 1).

TABLE 5.1 Culture sequence and chronology of the Aegean neolithic.

Radio-carbon date. (5568 half-life) — B.C.	PERIOD	AEGEAN REGIONS						Approx. date in calendar years. B.C.
		MACEDONIA	THESSALY	SOUTH GREECE	CYCLADES	CRETE	EAST AEGEAN	
	EARLY BRONZE AGE	Sitagroi V _a					Emborio IV Troy I	
c.2500		IV	E. Thess. I	Eutresis Culture	Grotta-Pelos culture	E.M.I.	V Kum Poliochni Tepe Blue	c.3200
	FINAL NEOLITHIC	IV III	Rachmani	Eutresis Gp. I – II Attic – Kephala culture		"Sub-neolithic" Phaistos Knossos I	VI Poliochni Black Kum Tepe Besikatepe	
c.3300		III	Larissa		?	II	VII	c.4100
	LATE NEOLITHIC	II	Dhimini	Matt-painted pottery		III	VIII	
c.4000		I			Saliagos Saliagos	IV	IX	c.4900
	MIDDLE NEOLITHIC	Early Servia	Sesklo	Neolithic Urfirnis		V VI VII	X Aghio Gala	
c.5000						VIII		? c.5600
	EARLY NEOLITHIC	Nea Nikomedeia	Proto-Sesklo	Early neolithic patterned ware Rainbow ware		IX X		
c.6000	MESOLITHIC		Voivi	Franchthi	—	—	?	? c.6300

Many relationships expressed in this table are hypothetical. But it does serve to bring out the reality of this final neolithic period in each of the regions under consideration.

SOME FEATURES OF THE FINAL NEOLITHIC

Despite the great variety of these finds, a number of similarities can be indicated which link together some of the different regions in the final neolithic. The Thessalian finds, which are supplemented by others elsewhere, suggest that fruits (figs, grapes, almonds and a new variety of pistachio) were now more systematically collected, while pure crops, of a single species, replaced the mixed crops of the earlier period. The three classes of domestic animal, sheep/goats, cattle and pigs, naturally do not change, although pigs possibly increase in importance at the expense of sheep and goat, almost to equal these in numbers.

As in the succeeding early bronze age, the Cyclades occupy a central and important position. The parallels of the Grotta-Pelos culture, which certainly began towards the end of the final neolithic period are considered in a later chapter. Despite the various points of contact which are now seen—between Kea and Attica for instance, or the Cyclades and north-west Anatolia—the Aegean was certainly far from a unity at this time.

The widespread distribution of pattern-burnish decoration on pottery has sometimes been taken as an indication of such unity (Fischer 1967), but the effect is illusory, for in reality the various regional styles were very different one from another. The Aegean pattern burnish of the late and final neolithic (plus the early bronze age in the case of Crete) may be divided into at least five categories (fig. 5.4).

- I. The Attic-Kephala Style. As already described, the fabric is generally red, while faulty firing or subsequent reduction will account for one or two black pieces in Aegina. The lines are very thick. Final neolithic of Attica and the north-western Cyclades.
- II. The Pyrgos Style (fig. 6.1). Black fabric with thin burnished lines, but without a reserved arrangement. The decoration is on the outside. The shapes are very distinctive—chalices and pyxides—and the style is limited to Crete, where it was first recognised at Pyrgos (Xanthoudides 1918). The recent excavations at Lebena define it as Early Minoan I.
- III. The Beşikatepe Style (fig. 5.3, 3). Usually black fabric, overall burnish outside, reserved panels inside crossed with a network of narrow lines (Lamb 1932). Also at Samos and Kum Tepe Ia. East Aegean final neolithic.
- IV. The Mainland Style. Categorized by Wace and Thompson, following Tsountas, as Γ1α2. It does not form a homogeneous group, and probably includes several independent traditions. At times one feels that the decoration arises almost spontaneously as the pots are being burnished. In general the fabrics are black, sometimes

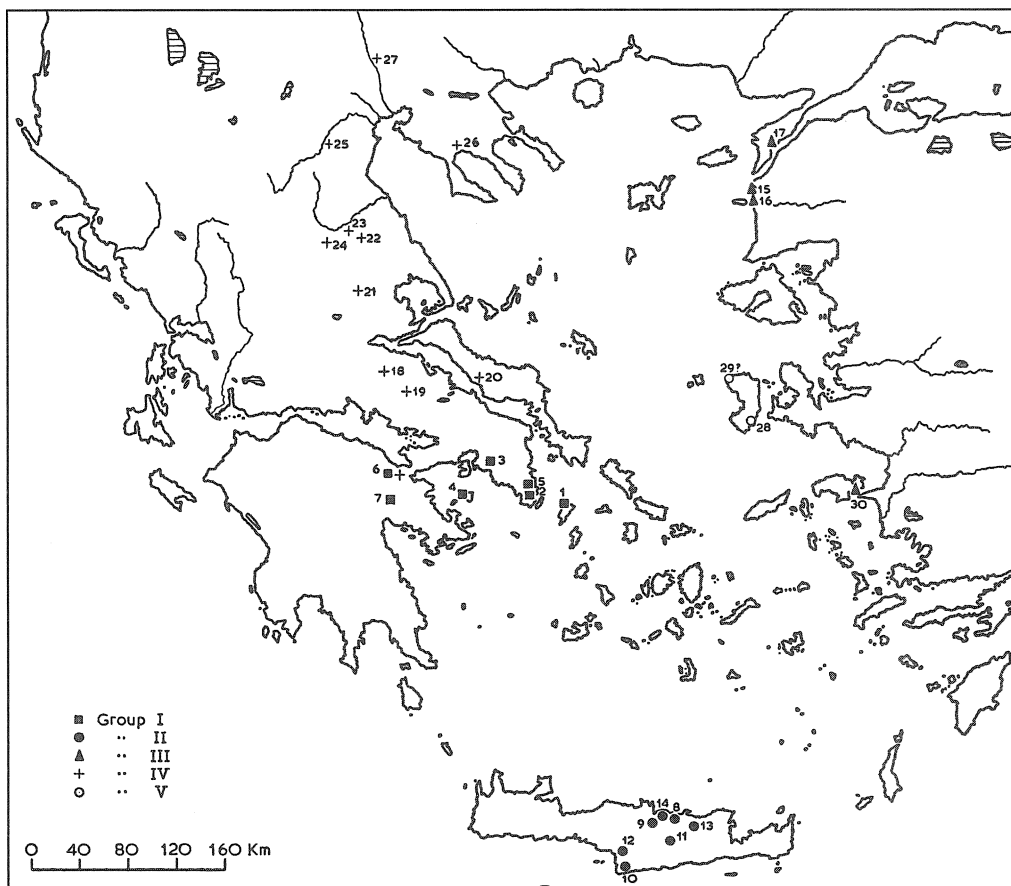


FIG. 5.4 The regional groups of pattern burnish pottery in the later neolithic and early bronze age of the Aegean. Group I, pattern burnish pottery of the Attic-Kephala culture; Group II, Pyrgos ware; Group III, Beşikatepe ware; Group IV, pattern burnish wares of central and northern Greece; Group V, Chios pattern burnish ware (see also notes to the figures).

with a high Larissa-ware lustre. Find spots include Tsangli, Messiani Maghoula, the Larissa region, Elateia, Orchomenos, Corinth and Varka Psachna in Euboia. Final neolithic of Thessaly and central Greece.

- V. Emborio. The pattern-burnish ware of Emborio has already been mentioned. Although the arrangement of lines resembles the Attic-Kephala style, they are thinner and the lustre is less rich. The fabric is generally grey black, and open bowls are not found, the commonest form being a collared jug. Another variety is also found at Emborio with red fabric, different shapes, and a tendency to leave reserved parallel lines. East Aegean late neolithic and final neolithic.

Doubtless other varieties occur. The aim of this list, however, is not to give a complete survey, but simply to show how numerous occurrences of this technique in fact are, and how meaningless must be a correlation on the simple basis of pattern burnish alone. It is certainly noticeable that the style is chiefly used in final neolithic times, but it is then that burnishing itself most widely occurs, perhaps as a result of the decrease in popularity of painted decoration. This fashion for burnishing may perhaps be due to the operation of some widespread causal influence, but the presence of pattern burnishing itself is no proof of a connection between particular instances.

Among the widespread features at this time, the decline in painted ware in the Aegean is indeed very noticeable. In Macedonia painted ware disappears altogether, and in Thessaly it is uncommon. Of course it was always absent at Knossos, and rare in the eastern Aegean.

The emergence of new burial practices also requires comment. Simple crouched burials, sometimes with sparse grave goods, are found from the early neolithic period onwards (Rodden 1962; Heurtley 1939, 54). A burial from pre-neolithic neothermal times was found in the Franchthi Cave (Jacobsen 1969). In the middle neolithic period a small oval cist grave was found at Hagiorgitika (Weinberg 1965a, 36), and at Prosymna several grave pits with grave goods and the bones, perhaps cremated, of the deceased were found (Blegen 1937, 25–8). This is in effect the earliest cemetery yet found in Greece, unless the burials within the settlement at Nea Nikomedeia are so considered. At Lerna a child-burial in a beaker was found (Caskey 1957, 159) and at Rachmani a similar child-burial (Wace and Thompson 1912, 244). These are all sporadic occurrences and do not compare in significance with the two final neolithic cemeteries now known. At Souphli what may reasonably be termed an urnfield cemetery was found. At least seven black burnished jars, assignable to the Larissa period, contained the cremated bones of the dead (Biesantz 1959, 70). In two cases the burial was accompanied by a further pot. These constitute the first well authenticated cases of urn burial and of cremation in Greece—perhaps the first in Europe. The Kephala finds which include pithos burials, constitute the first cist cemetery, and document the earliest multiple burials known from the Aegean. Of course, at Iasos on the west Anatolian coast, both round and rectangular cist graves have been found (Levi, 1962), but these and the cist and pithos burials described by Özgüç from Anatolia (1948, 22) are of early and later bronze age date. Our first evidence for burial in cemeteries thus comes from the final neolithic: and so far there is no case for deriving the custom from overseas.

Finally, the notable scale of the final neolithic finds at Knossos, despite the postulated destruction of their uppermost levels, must be mentioned. The extent of the site may have been some seven acres. The settlement there seems to have been on the agglomerate plan, with numerous rooms juxtaposed and few isolated buildings (fig. 6.4, 1; Evans 1921–35, II, 14). This gives a very different picture from that of the individually situated houses in the villages of central and northern Greece and the Balkans (fig. 5.1). Whether or not such a layout is seen in the earlier periods is uncertain. But the abandonment of

the open plan at Dhimni in the late neolithic and at Knossos by the final neolithic is clearly of significance.

From these rather fragmentary indications we can see that the neolithic in Greece was not a static period, marked only by changes in pottery style. Significant developments occurred in agriculture, settlement organisation, burial and technology. It is against this background that the innovations of the third millennium BC, the early bronze age, must be judged. The final neolithic period is admittedly little understood as yet: it may be that in it lies the key to our comprehension of many of the subsequent early bronze age developments.

This very brief sketch of the neolithic period sets the scene, as it were, for the consideration of the culture sequence in the third millennium. And it is to these cultures in the various regions of the Aegean that we must now turn.

Chapter 6

Crete in the Third Millennium BC

The early bronze age of Crete, Evans and Mackenzie's Early Minoan period, shows many striking advances in culture from the rather monotonous picture created by the Cretan neolithic. Metallurgy takes hold and flourishes, the crafts develop dramatically—pottery is attractively painted, beautiful stone bowls are carved from a variety of coloured rocks, and sealstones are minutely worked. These developments doubtless accompanied more basic changes, in settlement pattern and in subsistence, which we are only now dimly beginning to discern. Very significantly, from the standpoint of the archaeologist today, the Early Minoans buried their dead in collective tombs, in cave shelters, built ossuaries, and the so-called *tholoi* (round tombs of stone) of the great Mesara plain of south Crete. It is from these that the richest finds have come. The period ends with the foundation of the first palaces of Crete at the key sites of Knossos, Phaistos and Mallia. Their appearance marks the beginning of true civilisation in the Aegean (in the sense already defined).

Crete is not only the area of the prehistoric Aegean which has been most intensively explored: it is also the most fully described. Indeed Crete is the only region of the Aegean whose early bronze age has received detailed treatment in previous works. In *The Palace of Minos*, Evans outlined the Early Minoan period, and the standard works of Pendlebury (1939) and Hutchinson (1962) both devote chapters to it. Excellent monographs on Early Minoan metallurgy and stone vases have recently appeared (Branigan 1968a; Warren 1969b), and Branigan has devoted two books to the culture (1970a; 1970b), while Warren is preparing a detailed study. In consequence, far more is known of the culture than can effectively be set out in a single chapter. The aim here is to focus on the culture sequence, or rather on the phases of development of what was undoubtedly the evolution of a single culture. Specific topics such as settlement pattern, subsistence and metallurgy—in themselves perhaps of greater interest—will be discussed in their general Aegean context in later chapters.

Because of the mixed nature of the finds in the collective tombs, and the sparsity of well-excavated settlements, the Early Minoan period is in some ways a confusing one archaeologically. For that reason it is necessary to define these chronological phases

with care. This involves a rather lengthy consideration of pottery styles, which in themselves are of very restricted interest. But the arrangement of the other material, and hence the entire historical reconstruction, must rest upon this basis.

The Early Minoan culture sequence

DEFINING EARLY MINOAN I

The chronological division of the Early Minoan period was suggested by Mackenzie and Evans in the first decade of the century, following the recognition of this period of the Cretan bronze age as preceding the foundation of the first palaces at Knossos, Phaistos and Mallia, in what was termed the Middle Minoan I period. The division was not set out in full detail, however, until the publication of the first volume of *The Palace of Minos* in 1921. Nor was it at that time well documented stratigraphically, as Åberg rather forcefully pointed out (1933, IV, 138 f.). He suggested a simple division of Cretan prehistory into Prepalatial, Kamares and Late Minoan periods. This proposal has indeed a pleasing simplicity and has been retained by many subsequent scholars, with the modified terminology prepalatial, protopalatial, neopalatial. Pendlebury (1939, xxxvi) refuted Åberg's criticisms by instances of the stratigraphic succession at Knossos, but the published accounts of these and other Early Minoan assemblages were not sufficiently detailed to resolve the matter conclusively.

In more recent years Doro Levi has been a consistent critic of the sequence of phases proposed by Evans which, he reports, are not documented by his excavations at the second great palace of Crete, at Phaistos (Levi 1964a, 161; 1964b, 5). The Knossian reply is simply that the site of Phaistos does not adequately document the Early Minoan period. And certainly closed deposits of Early Minoan date are sufficiently abundant elsewhere in Crete to make a long Early Minoan period seem likely.

The root of the problem is that the most important Early Minoan finds (with the exception of the settlements of Vasiliki and Myrtos) are burial deposits—all of them collective, and used over a considerable period of time. Thus, of the important round tombs in the Mesara excavated by Xanthoudides, only three (Salame, Koutsokera and possibly Koumasa *tholos* A) appear to be without Middle Minoan finds. Some of the ossuaries at Mochlos in east Crete are more homogeneous in content, but such collective deposits, which were not sealed, and were open to the possibility of later internment, are not really a suitable basis for sound stratigraphic discussion.

Several other assemblages -like Miamou (Taramelli 1897), or the various Early Minoan groups at Palaikastro (Bosanquet 1902) are so small that the absence of a particular feature (such as Vasiliki ware) is hardly to be considered significant. And other groups of material, such as the supposed Early Minoan I finds at Mochlos, or the Ellenais house are so briefly illustrated in the publications, if at all, as to be of little practical value (cf. the list of Early Minoan I sites given by Pendlebury, 1939, 55).

Fortunately two recent excavations, at Knossos and Lebena, give categorical stratigraphic evidence for the Early Minoan succession. It is worth quoting extensively from Sinclair Hood's report of the stratigraphic excavation at Knossos in view of the fundamentally important find of a closed deposit of Early Minoan I pottery in a well:

'The Early Minoan I well was over ten metres deep with a uniform fill of dark ashy earth and large quantities of pottery, all homogeneous and assignable to Early Minoan I except for a handful of neolithic sherds. At the bottom of the well were remains of large water jugs with plain yellow-brown wiped or scraped surfaces. The rest of this pottery from the fill of the well included fragments of jugs decorated in dark-on-light in the Aghios Onouphrios style and many pieces of high footed bowls with burnished black, grey and red surfaces, and designs in "pattern burnish". Notably absent were the legs of cooking pots which appear, however, during the subsequent Early Minoan II phase' (Hood 1963, 92).

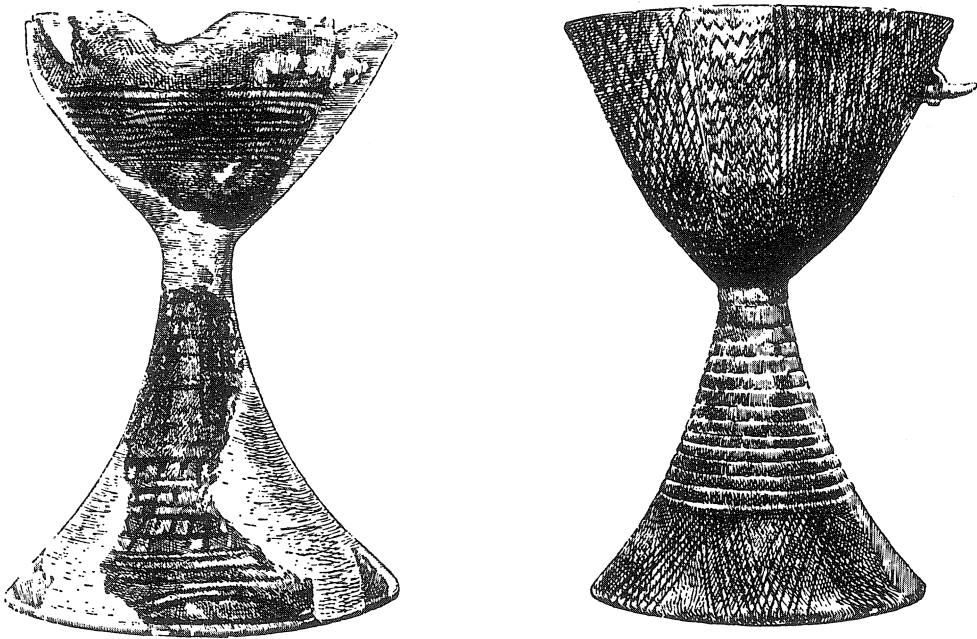


FIG. 6.1 Early Minoan I chalices in the pattern-burnished Pyrgos ware, from the Pyrgos cave (after Evans). Ht c. 20 cm.

Hood goes on to say that Early Minoan II 'is characterised by goblets on a fairly high foot and by the appearance of the mottled fabric known as Vasiliki ware'. This essential, stratigraphically attested distinction is carried further by Stylianos Alexiou's important finds at Lebena in south Crete, where one of the round tombs, tomb II, had a pure Early Minoan I level stratified below a level with Early Minoan II and Middle Minoan I material (Alexiou 1958; 1960; 1963).

The very rich finds at Lebena thus allow a more adequate distinction to be made between the pottery of Early Minoan I and Early Minoan II.

The Early Minoan I pottery of Lebena comprises four principal fabrics:

- (a) Pattern burnished pottery, generally of grey fabric, in what is known as the Pyrgos style after the site of that name (fig. 6. 1; Xanthoudides 1918).
- (b) Dark-on-light painted pottery in the Aghios Onouphrios style with red lines on buff or cream ground (fig. 6.2; Evans 1895).
- (c) Light-on-dark pottery, with designs very like the preceding, the Lebena style.
- (d) Plain burnished ware, dark and frequently red in colour.

The principal painted forms are the wide-mouthed jug (Daux 1959, 842, fig. 3; Marinatos 1929), the necked globular jar with two handles (Alexiou 1960, fig. 20; Xanthoudides 1918, fig. 6), the broad one-handled cup (Daux 1959, 842, fig. 4; Alexiou 1951, pl. 1Δ', fig. 2), and the pyxis standing on three feet and with a deep-sided lid (Alexiou 1960). In the pattern-burnished Pyrgos ware, tall chalices are common (at Pyrgos and Arkalochori) and three-footed cylindrical pyxides are found at Lebena. The footed askos is found at Lebena, as at the site of Kanli Kastelli, and animal vases are common.

It is clear, therefore, that the distinctive innovations in the pottery of the Early Minoan I period are the introduction of painted decoration (both dark-on-light and light-on-dark) and of the jug. An interesting feature at Lebena is the almost complete absence of incised ware from the Early Minoan I material. It almost looks as if incised decoration (which is rare in the final neolithic) declined in Early Minoan I before appearing in quantity early in Early Minoan II, and incision should not necessarily be regarded as an important element of continuity between neolithic and Early Minoan. Other features show continuity with the preceding final neolithic as discussed in chapter 5. In particular pattern-burnished ware occurs already in neolithic deposits (Levi 1961–62, fig. 132; Evans 1921–35, II, fig. 3m, and fig. 4), while a typically final-neolithic horned suspension pot was found in the Early Minoan I deposit at Lebena (Alexiou 1960, fig. 10; compare Tod 1902, 341, fig. 1).

THE EARLY MINOAN I–II TRANSITION

Turning now to the features which separate the Early Minoan I and Early Minoan II assemblages from each other, we find the chief change is in the introduction of the mottled Vasiliki ware (Marinatos and Hirmer 1960, pl. III) this may be taken as the defining innovation for the Early Minoan II period, just as the appearance of Aghios Onouphrios ware marked the inception of Early Minoan I. Spouted shapes, notably the beaked jug and the teapot develop; spherical pyxides are found, and incised decoration, often in the form of concentric circles, occurs. On the basis of the Lebena finds it seems that pattern-burnish decoration becomes very much rarer, although apparently it does not entirely disappear.

Unfortunately, this definition, which is in accord with the finds at Lebena, the Knossos well, Myrto and Vasiliki, at once raises difficulties on certain other sites. Neither the Pyrgos Cave or the Kanli Kastelli shelter contain Vasiliki ware, although both are rich in Early Minoan I ceramic finds. A strict application of the criterion would make both Early Minoan I in their entirety. Yet the Pyrgos Cave contains long daggers as well as a folded-arm figurine (Xanthoudides 1918, fig. 15) which some authors would prefer to see as Early Minoan II in date. And Kanli Kastelli likewise has these long daggers.

It is perhaps largely this difficulty which has led some authors such as Hutchinson (1962, 141), Branigan (1968a, 58) and Warren (1965) to use the terms Early Minoan IIa and Early Minoan IIb, sometimes without rigorous definition. Only at Vasiliki have

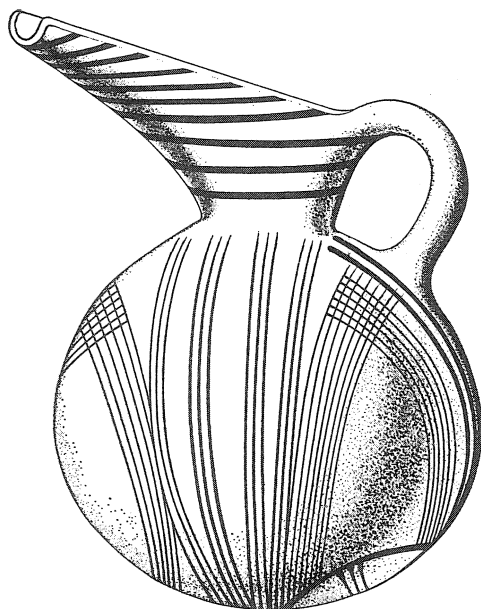


FIG. 6.2 Early Minoan I jug in the dark-on-light painted Aghios Onouphrios ware, from Aghios Onouphrios (after Evans). Ht c. 21 cm.

the Early Minoan II levels been given a plausible stratigraphic division. Hutchinson suggests that in the Early Minoan IIa period, Vasiliki ware was restricted to east Crete, being adopted in central Crete in the IIb phase. This suggestion—which again highlights the inadequacy of the periodic system of nomenclature when applied to a cultural assemblage rather than simply to a division of time—leaves the Early Minoan IIa assemblage undefined. Warren has been more explicit, stating ‘there is no hard and fast line between Early Minoan I and Early Minoan II’ (1965, 19). He further clarifies: ‘Early Minoan IIa is that period, definable by the stratigraphic sequences, where mottled Vasiliki ware occurs but has not yet assumed full domination’, but he goes on to class as Early Minoan IIa, assemblages where Vasiliki ware apparently does not in fact occur, for example the early ossuary at Palaikastro. Two of his defining Early Minoan IIa shapes—the lentoid pyxis and the cylindrical pyxis on three feet—occur already in the Early Minoan I deposit at Lebena and continue later.

One problem here is the incised ware: at least four decorative styles are seen, most commonly on a fine grey fabric.

- (a) Heavy incision, common at Pyrgos. Applied to cylindrical and conical pyxides (Xanthoudides 1912, fig. 9, 62–65 and pl. III) and other shapes. The vessels are often rather crudely made, brown in colour and thicker than the other incised fabrics. This style was classed by Pendlebury as Early Minoan III (1939, 85 and pl. XIII, a–c).
- (b) Fine incision, utilising concentric circles (Xanthoudides 1924, pl. I, 4191; Taramelli 1897, fig. 15). Commonest at Lebena in the Early Minoan II levels. Applied often to spherical pyxides or neck jars.
- (c) Fine incision of oblique parallel lines, possibly combined with decoration of type (b). Applied often to spherical pyxides (Xanthoudides 1924, pl. I, 4188 and 4194; pl. XVIII, 4195 and 4196).
- (d) Excision, seen occasionally on spherical jars (Dawkins 1904–5, 290).

At the moment pottery of these classes may well belong exclusively to the Early Minoan II period, perhaps the earlier part of it, but it would be wrong to be dogmatic. It is, in the absence of quantitative analyses of the ceramic assemblages, very difficult to define a clear boundary between Early Minoan I and Early Minoan II. At present it may be simplest to designate apparently mixed deposits such as those of Kanli Kastelli and Pyrgos simply 'Early Minoan I–II' to emphasise that the distinction remains in many of the collective burials an uncertain one.

DEFINING EARLY MINOAN II AND 'EARLY MINOAN III'

The beginning of the Early Minoan II period is thus established for us through the definition of Early Minoan I at Lebena and the Knossos well. Vasiliki ware with accompanying new forms appears, patterned-burnish ware declines markedly and at Lebena, at least, incised ware becomes more common.

To define the later end of Early Minoan II is a still more difficult problem, which involves us immediately with the definition and indeed the very existence of the so-called Early Minoan III phase. In 1939 Pendlebury wrote:

'The Early Minoan III period is a curious and difficult one to define for, as we shall see, it can in some ways be called transitional between the Early and Middle Bronze Ages in Crete, yet at the same time it has features of its own in the east and south which mark it off as a new epoch, while in the centre and north it is very clearly the end of the archaic Minoan period' (p. 78). He went on, 'The great difference between the pottery and that which has gone before is the substitution of light-on-dark for dark-on-light decoration' (p. 80). The Lebena finds make clear that in the Mesara area at least, light-on-dark decoration is found in the Early Minoan I and Early Minoan II periods, and the presence of this technique alone cannot be considered conclusive.

Hood's Knossos report is very relevant here, and again should be quoted *in extenso*:

'The Middle Minoan Ia period is characterised by goblets on a low foot, in shape like a modern egg-cup but larger, Early Minoan III, as this was defined by Evans, does not seem to exist at Knossos. Evans himself never identified a pure Early Minoan III deposit with characteristic features at Knossos, and he defined the period in terms of stray finds from Knossos itself, and of deposits from other sites in the east of Crete. It looks very much as if the material which Evans grouped as Early Minoan III is contemporary with his Middle Minoan Ia at Knossos, and some of his Early Minoan III material may be even later, contemporary with Knossian Middle Minoan Ib or even Middle Minoan II.

On the other hand the Middle Minoan Ia material is vast in quantity. It probably covers quite a long period of time, and is capable of sub-division. In the earliest phase there appears to be no trace of polychrome decoration. This pre-polychrome phase might therefore be called Early Minoan III and it may be this phase that Evans meant by Early Minoan III itself' (Hood 1963, 93). This phase, prior to the introduction of polychrome ware, will, following Evans, be designated Early Minoan III in Hood's forthcoming Knossos report.



FIG. 6.3 'Teapot' from Knossos with polychrome decoration, assigned by Evans to the 'Early Minoan III' period. Red stripes with white borders on dark ground (*after Evans*). Ht c. 9 cm.

The Lebena finds give a similar picture. In tomb IIa (adjacent to tomb II) a sand layer separated a pure Early Minoan II deposit from the overlying Middle Minoan Ia one. And elsewhere the Early Minoan II burials were followed immediately, it seems, with grave goods of Middle Minoan Ia type. Alexiou concluded (1963, 90), 'The Early Minoan III period is absent, and as Evans himself suggested (1921–35, I, 164) must correctly be considered as a Middle Minoan I style of eastern Crete.'

This pertinent observation raises again the question of regional differentiation within the Early Minoan period, and a clear picture of these chronological phases will emerge only when this aspect of the problem is tackled. At present, then, chronological sub-divisions within the Early Minoan II period (as well as the definition of 'Early Minoan

III') must at present rest on rather doubtful typological grounds. It seems likely that valid stratigraphic distinctions will yet be made within the Early Minoan II period. But the onus is upon those who will make them to document them fully and convincingly.

The Early Minoan I period

The Early Minoan I period is defined, as we have seen, on the basis of new pottery shapes and fabrics (figs. 6.1–6.2) but its importance lies in the new settlement pattern now emerging, and in the changes, now only dimly hinted at in the archaeological record, which are seen much more clearly in the Early Minoan II period. The comments here will be restricted to a brief review of the evidence: discussion of the underlying changes taking place is deferred to Part II.

SETTLEMENTS AND CEMETERIES

There are so far no extensively excavated settlements of the Early Minoan I period. The well at Knossos, already cited, has yielded valuable stratigraphic evidence, but there are no house plans from that site. The scanty and virtually unpublished remains at Mochlos and Ellenais Amariou establish merely that rectangular houses were still in use. It seems likely that the neolithic agglomerate plan seen already at Knossos, which is repeated at Early Minoan II Vasiliki, was prevalent also during the Early Minoan I period. A house at Phaistos, possibly of this date, had a floor decorated with red stucco, and a circular hut of final neolithic or Early Minoan I date has recently been found there.

Most of the known Early Minoan I material comes from burials. The tradition of burial in caves and rock shelters, seen already in the final neolithic, persisted and the finds at Pyrgos and Kanli Kastelli are among the most important of the period. The great innovation at this time, however, was the inception of the built tomb used as an ossuary or for collective burial. At Lebena (Gerokambos) in the Mesara Plain a circular tomb was found with well stratified Early Minoan I grave goods, and several other *tholos* tombs were apparently built at this time. Branigan (1970b, 22) suggests that at least twenty-two were built in the Early Minoan I period, as against seven in Early Minoan II and fourteen in Middle Minoan I. They are circular in plan, generally between 3 and 10 m in diameter, with an entrance at the east side. The walls, which sometimes reached a height of at least 2 m, were of large, roughly dressed stones, bonded with clay. Although it was thought by Xanthoudides that they were vaulted in *tholos* construction, it seems more likely that they had a simple brushwood roof, perhaps weighted down with stones which have (for instance at Lebena II and Kamilari) been found packed together, as a result of the roof's collapse, on the floor of the tomb.

Another possibility is that they were roofed with mud-brick vaults, resting on the stone walls which are all that now remain.

MATERIAL CULTURE

At this time the grave goods were predominantly of pottery. At Lebena there are no stone bowls in the Early Minoan I levels, and the obvious implication is that stone bowls were not at that time manufactured in Crete (Warren 1965, 8). There is other evidence to suggest that stone bowls were imported already from Egypt by this time.

Sealstones are likewise not found at Lebena in the early deposits, and this may lead to a similar conclusion. On the other hand, the products of Early Minoan I craftsmen were not necessarily all represented among the grave goods of the lowest levels of tomb II at Lebena. In Warren's extensive excavations at the important Early Minoan II settlement at Phournou Koriphi, Myrtos near Hierapetra (Warren 1968) only three sealstones were found, and metal was represented by a dagger blade—yet this does not prevent our concluding that metallurgy and the glyptic arts were well developed by the end of the Early Minoan II period. In the same way it is possible that the Early Minoan I crafts were more developed than the finds have so far indicated.

Again no metal has been found in undoubted Early Minoan I deposits. A scrap of copper found by Seager (1912, 93) at Mochlos is the only possible exception. But the copper axe from neolithic levels at Knossos (fig. 16.2) is a reminder that copper was already known (Evans 1921–35, IV, 4 and fig. 3, f.) and there is no reason to suppose that this acquaintance diminished. On the contrary, Branigan in his detailed study (1968a, 54) while conceding that 'no copper objects have been found in pure Early Minoan I deposits' underlines the significance of the Pyrgos and Kanli Kastelli metal finds, chiefly daggers and awls, and concludes that these types and several others were probably already manufactured in Early Minoan I times.

Figurines were certainly made: in the first place there are pottery finds of animals at Lebena. Tomb II at Lebena yielded also a marble (or encrusted limestone) figurine of schematic figure-of-eight shape (cf. Evans 1895, fig. 124), and it may well be that the rather shapeless and schematic figurines from Pyrgos (Xanthoudides 1918, fig. 14) are datable to Early Minoan I. The typically Cretan variant of the marble schematic figurine, the Aghios Onouphrios type (fig. 19.4; Renfrew 1969a, 27) may also date from this period. The most significant feature of all these finds, however, is that they are from burials. And while the Early Minoan I burials in the Pyrgos Cave follow the final neolithic tradition (seen at Eileithyia and Partira) the round tombs at Krasi and Lebena are the beginning of a new and influential tradition in Crete.

The overseas connections of Early Minoan I fall apparently into two classes. First are those forms which show a relationship with pottery of the Grotta-Pelos culture of the Cyclades, which are discussed below with that material. Secondly there are similarities with the west Anatolian cultures, especially Troy I, which have recently been emphasised by Warren. These are mentioned again in chapter 20. There are no convincing links with mainland Greece. Nothing in the Early Minoan I levels unequivocally indicates contact with Egypt or the Near East, although the possibility of influence from the Ghassulian culture of Palestine has been advanced. We should bear in mind that two

Predynastic or Early Dynastic Egyptian stone bowls (cf. fig. 20.2) were found in a late neolithic house at Knossos, and so some contact with Egypt had already been established (Warren 1965, 30–31, nos. 5 and 13).

The Early Minoan II–III period

The Early Minoan II period clearly shows a dynamic expansion and development in the life of prehistoric Crete. There is a risk, however, of exaggerating this striking change by assimilating to Early Minoan II all the finds which have previously been termed ‘Early Minoan III’, some of which may as plausibly be ascribed to Middle Minoan I. Few of the rich tombs at Mochlos were without Middle Minoan I objects, or ‘Early Minoan III’ objects which might now be given a Middle Minoan I date. Tombs I, II, VI (lower), XIX and perhaps XXI do, however, essentially antedate the middle bronze age, and show already the impressive gold diadems and jewellery which at Lebena are seen in the Middle Minoan I level.

SETTLEMENTS AND CEMETERIES

More settlement sites are known for the Early Minoan II period than for the preceding Early Minoan I: Warren has stated that fifty-four open sites are known and twenty-two cave sites. Two of these settlements, Vasiliki and Phournou Koriphi near Myrtos, both in east Crete, have been excavated. Together they give a vivid impression of proto-urban settlement in mid third millennium Crete.

At Vasiliki building remains are of two phases. Those of the later phase are by far the more impressive (fig. 6.4, 2). The published plan shows a carefully laid-out building complex, more than 30 m long, with regular rectangular rooms. Construction was of timber-laced mud brick, together with plastered clay (Boyd Hawes 1908). On the one hand, in looking at this plan, one recalls the similarly agglomerate nature of the house in the final neolithic deposits at Knossos (fig. 6.4, 1). And on the other hand the complex of rooms is a forerunner of that seen in the stone-built palaces of the Middle Minoan period some centuries later (fig. 4.4). A considerable quantity of pottery was found, including much of the brown mottled ware now termed ‘Vasiliki ware’, which is a characteristic feature of Early Minoan II. Although some writers regard this ‘house-on-the-hilltop’ at Vasiliki as a ‘mansion’—implying the existence of many smaller houses in the village—a different interpretation seems more plausible. This house at Vasiliki may itself constitute much or all of the village there, a village on the agglomerate plan like Çatal Hüyük in the Anatolian early neolithic or Dhimini in the Thessalian late neolithic.

This view is strengthened by Warren’s important finds at Myrtos (Phournou Koriphi). A small village (fig. 6.5) was found there on the summit of a low hill overlooking the southern coast of Crete. Partly because of the irregular terrain, perhaps, the plan of

this village is much less regular than at Vasiliki. The foundations of the walls are of stone, their upper parts of mud brick, and they were sometimes decorated with red painted plaster. The rooms are in principle rectangular, although their shapes are, in fact, irregular. On the south side, on the cliff edge and indeed partially eroded, was a

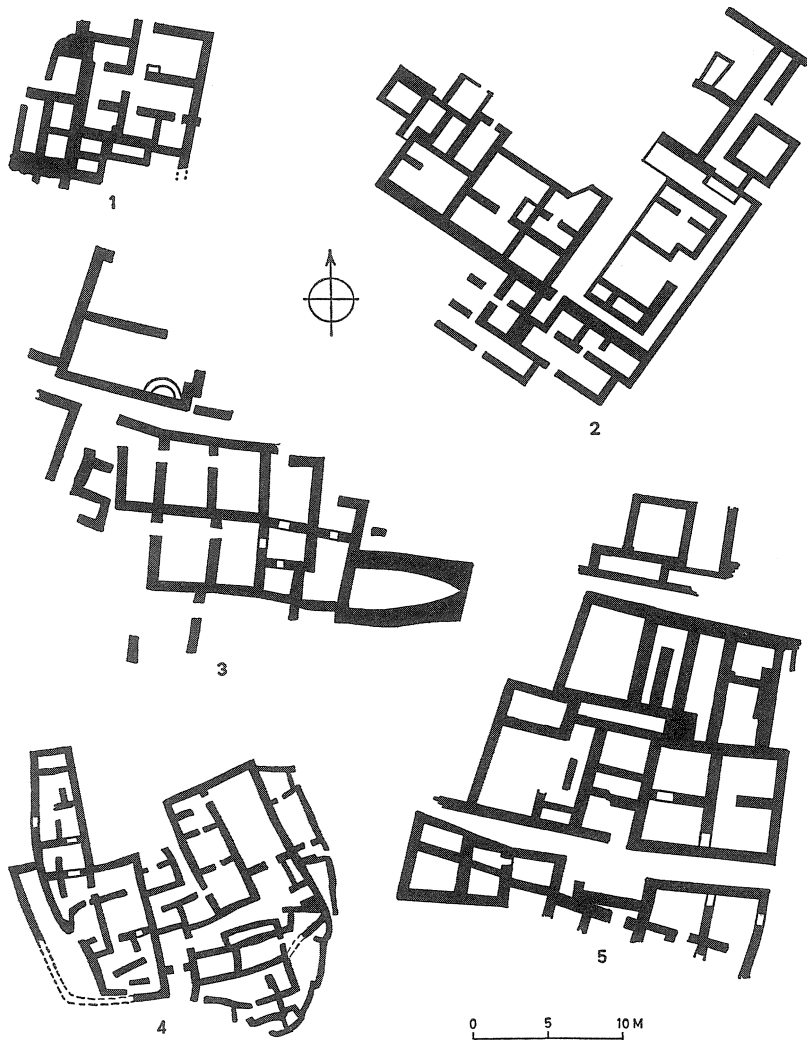


FIG. 6.4 House blocks of the early Aegean, shown at the same scale.
 1. Late neolithic House A at Knossos;
 2. Early Minoan II 'House on the Hilltop' at Vasiliki;
 3. Buildings of the Korakou culture ('Early Helladic II') at Aghios Kosmas;
 4. Insula VIII of the Troy II period at Poliochni in Lemnos;
 5. Street and houses of the Second City at Phylakopi in Melos.

semi-circular stretch of wall. Again, therefore, we see a village on the agglomerate plan.¹ A complex of rooms at the north side of the summit area contained a large spouted tub and channels for drainage, and the excavator suggests that this area may have been used for the fulling and dyeing of textiles.

More than 250 complete vases were found, together with a range of domestic tools in stone and clay. A copper dagger was recovered, and three sealstones, as well as sealings (seal impressions) in clay—finds of considerable significance which are discussed again in Part II. The seals may have been carved at the site itself. Clay figurines were also found.



FIG. 6.5 Plan of the stone walls and foundations of the Early Minoan II settlement at Phournou Koriphi, Myrtos (based on plan by Minto, by kind permission of the excavator Dr P. M. Warren).

The site belongs to a single phase of occupation, late in the Early Minoan II period, but probably prior to the east Cretan 'Early Minoan III', since no white-painted ware was found. The site was destroyed by fire, and radiocarbon determinations for the destruction have been made: 2192 BC, 1855 BC, and 1785 BC (Q953: 950 and 951) in radiocarbon years, giving a mean of 1910 BC. This suggests a date in calendar years for the destruction, of between 2600 and 2100 BC. Probably the destruction took place about 2200 BC.

The information gleaned from these very important sites is supplemented by others, such as Palaikastro and Knossos, where the finds are more scanty. The main source of

¹ I am particularly grateful to Dr Warren for permitting the inclusion here, in advance of publication elsewhere, of a sketch plan of Myrtos, which is based on the detailed large-scale plan of the site drawn by Mr Ken Minto for Dr Warren, to appear in the final excavation report.

our knowledge of the material culture of the Early Minoan period comes, however, from tombs. In southern Crete especially, the round tombs of Mesara type (fig. 19.11) were in intensive use: those built in the Early Minoan I period continued, several more being added. In consequence, the basic publication of Xanthoudides is a major source for information of the principal classes of Early Minoan II craftsmanship (see Xanthoudides 1924 and Branigan 1970b).

Cave burial continued, as some finds, probably of Early Minoan II date at Pyrgos, indicate. And rectangular built ossuaries, especially in east Crete, are now common. The most important of these, with regular rectangular rooms, were at Mochlos, where a whole series was excavated by Seager (1912, fig. 16.7) yielding rich grave goods. Similar ossuaries have been found at Palaikastro, Gournia and Archanes in central Crete. Another variety, square in plan and divided into long, narrow parallel chambers, is also seen at Palaikastro.

At the end of the period, at the time designated 'Early Minoan III' by some writers, two new burial forms are seen. The first involves burial in a large clay coffin or *larnax*. Twenty of these were found in the Pyrgos Cave, measuring up to 1 m 20 cm in length, and in the shape of elongated ellipses (Xanthoudides 1918, 138 and 140–42). These may be the ancestors of the splendid painted larnakes of the Late Minoan period. Burial in large jars or pithoi are also seen, notably at Pachyammos in eastern Crete, where a cemetery of pithos burials was found (Seager 1916).

These various settlement and burial sites have yielded the abundant finds which build up the picture we have of the Early Minoan II period.

MATERIAL CULTURE

The material finds of the Early Minoan II period, thanks principally to the profuse grave goods in the Mesara round tombs and the rectangular ossuaries, are particularly abundant. This phase of the Early Minoan culture is, in consequence, better documented than any other of the third millennium Aegean. Many aspects of this material are considered in Part II.

The pottery fabrics and shapes which serve to define Early Minoan II (with Early Minoan III) have been discussed already. In general the painted ware of Early Minoan Crete contrasts strikingly with the dull monochrome of Cretan neolithic. Among the shapes, vessels for drinking and pouring are well represented.

The splendid stone vase production, one of the most striking features of Early Minoan art, now began. The earliest are a group of vessels in chlorite schist, often decorated with incisions (fig. 6.6, Warren 1965). In the later part of the Early Minoan period a wide variety of stones was employed, in a considerable range of shapes. Prominent among these was the 'block vase', of rectangular form with a series of holes cut to make a multi-compartmented receptacle. The development of this typically Minoan industry has recently been set out in detail (Warren 1969b).

At the same time the sculptural ability of the Early Minoan craftsmen is reflected in a splendid series of sealstones, whose first manufacture dates apparently from the Early Minoan II period (fig. 6.7; Matz 1928; Kenna 1960). Many fine examples from the Mesara tombs are illustrated by Xanthoudides (1924).

Figurines of several forms are now seen, including vases of animal and human form (e.g. Fig. 19.8; Pendlebury and Money-Coutts 1936, pl. 13). The very simple schematic figurines of marble, most notably the Aghios Onouphrios type (fig. 19.4) are still made, and folded-arm figurines imported from the Cyclades. Soon they were copied in Crete,

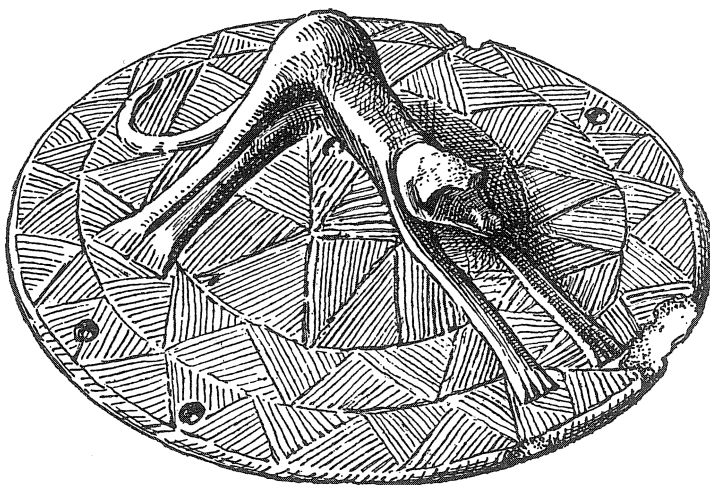


FIG. 6.6 Incised pyxis lid of chlorite schist, from tomb I at Mochlos. Diam. 11 cm (after Seager).

and the local sculptors produced a recognisable type: the Koumasa variety (pl. 30, 3, 4 and 6; Renfrew 1969a, 18). A further series of figurines of stone is rather less sophisticated in execution (cf. Pendlebury and Money-Coutts 1936, pl. 18).

The most important and striking development in the Early Minoan II period is the rapid growth of metallurgy. As discussed in chapter 16 the antecedents for this development may be discerned earlier, but it is now that the daggers of copper and bronze were made in greatest numbers, and jewellery and adornments, some of them very beautiful (fig. 6.8; pl. 18, 4) were made in gold and other metals. Metal tools are surprisingly rare in Early Minoan Crete, but the quantity of daggers found in the collective tombs is very striking.

The overseas connections of Early Minoan II are more numerous than those of Early Minoan I. Some of the Cycladic ones, notably the figurines, are considered in the discussion of the Keros-Syros culture in chapter 11 and the relationships in metal working in chapter 16. The important contact with the Near East documented chiefly by finds of ivory, are mentioned in chapter 20. The only clear indication of contact with mainland Greece, other than the apparently Minoan seal from Aghios Kosmas (Mylonas 1959,



FIG. 6.7 Ivory seals of Early and Middle Minoan date from the larger *tholos* tomb at Platanos in the Mesara plain (after Evans). Scale c. 1 : 1.

fig. 166, 13) is given by the important finds at Kastri on Kythera (Coldstream 1970), although mention should be made also of a little jug from Boeotia (Sotiriades 1908, fig. 13) which has Cretan resemblances (cf. Seager 1912, fig. 13, and the butterflies on the dish) but may in any case be of Middle Helladic date. At the hillock of Kastraki near Kastri on Kythera, a rubbish pit was found containing material of the Eutresis and Korakou cultures. This settlement was followed by the Early Minoan II occupation of

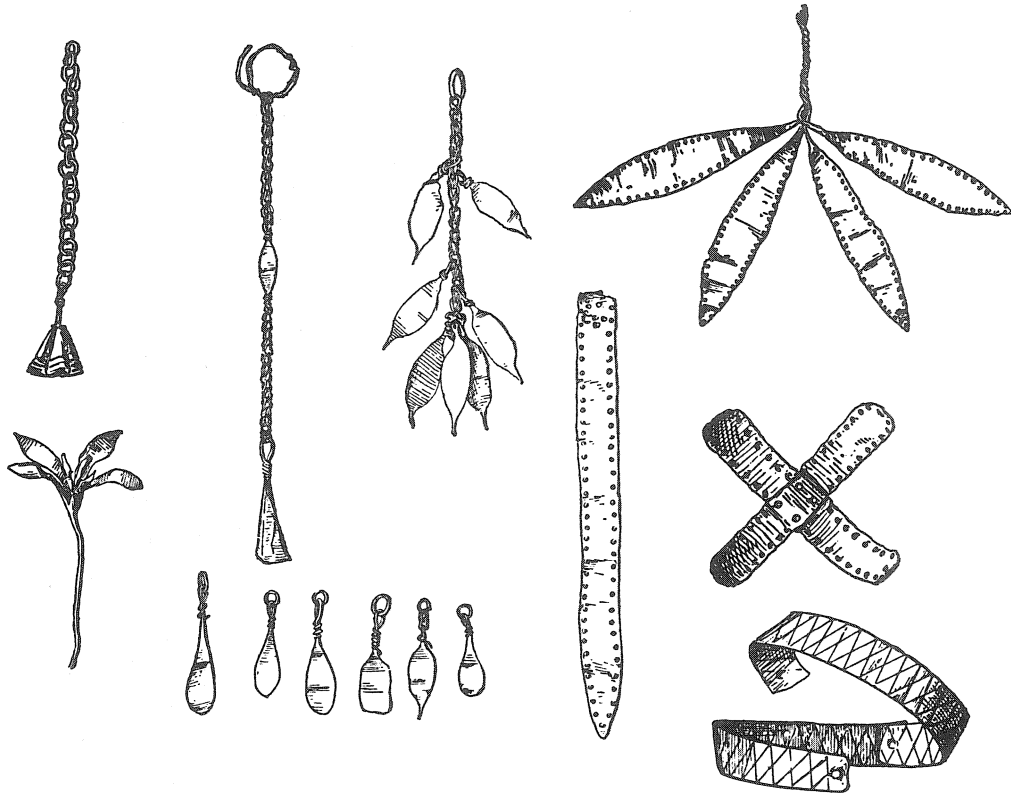


FIG. 6.8 Early Minoan gold jewellery from tomb II at Mochlos (*after Seager*). Scale c. 2 : 3.

the site of Kastri itself. There are undoubted finds there of Early Minoan II–III pottery, and a marble jug from Kythera probably comes from this site (Wolters 1891, 53). Kastri in Kythera can be regarded as a Minoan colony, the first of several sites to show signs of Minoan presence during the bronze age.

Later developments

The early bronze age of Crete is brought to an end by the foundation of the first palaces. At Knossos and Mallia, pottery formerly designated Middle Minoan Ia is found:

Phaistos may have been founded a little later (Pendlebury 1939, 97). The clarification and more precise definition of terminology for the end of the Early Minoan and beginning of the Middle Minoan periods may soon be undertaken by Hood. Meanwhile the conventional usage will be followed. The plan of the later palace at Mallia supposedly follows closely that of the first foundation (fig. 4.4). A schematic plan is available also for the Middle Minoan palace at Knossos. Clearly most of the features seen in the later palaces, including the provision of copious storage facilities, were already present.

Mention should be made here of the remarkable hypogeum at Knossos (fig. 6.9), which was apparently constructed before the first palace there, and may belong to the

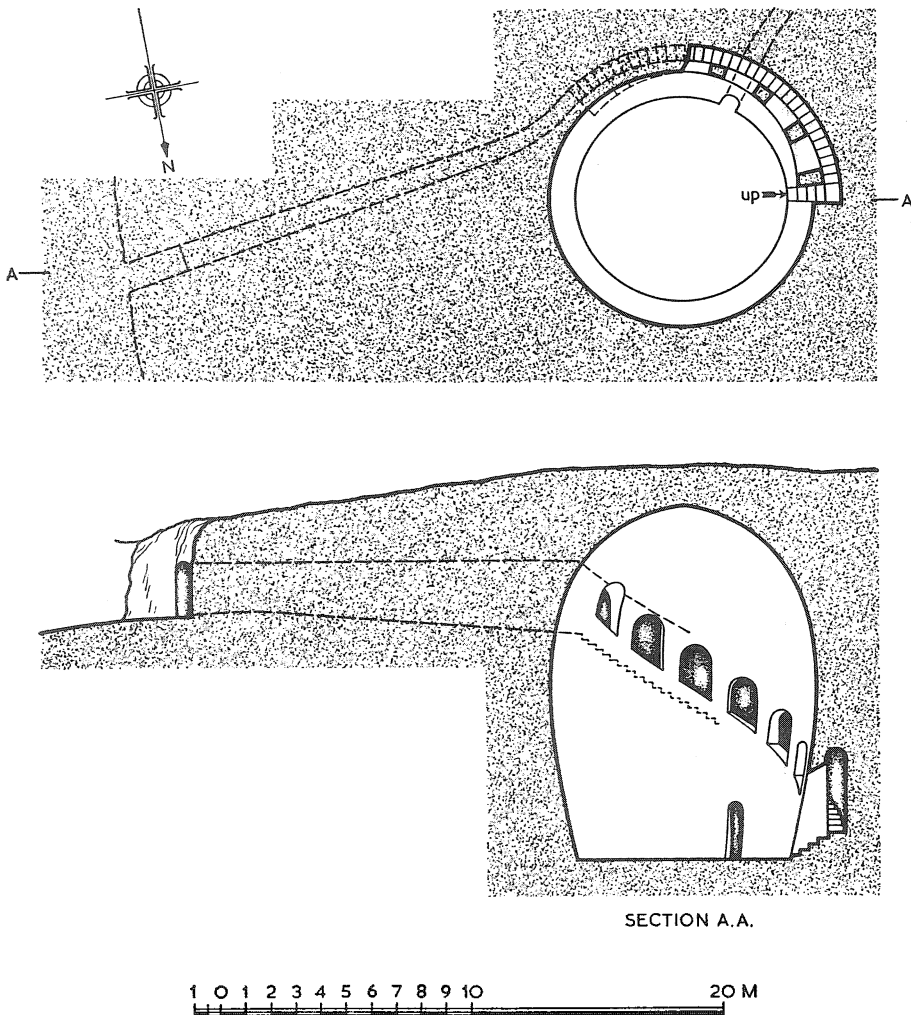


FIG. 6.9 The hypogeum at Knossos, which may have served as a granary, and was assigned by Evans to the Early Minoan III period (after Evans).

'Early Minoan III' period. A large underground chamber, dome-shaped, and with a staircase leading down from the top, it may have been used as a granary.

The continuity in the transition from prepalatial to protopalatial Crete must be emphasised. The significance of Vasiliki and Myrtos as proto-urban settlements has already been indicated. There is continuity in burial too—Chrysolakkos, the rich ossuary of the First Palace at Mallia, is simply a development from the Early Minoan ossuaries. Burial in rock-cut tombs is, however, a new feature in Crete in the Middle Minoan period. There is great continuity also in technology and craft.

With the establishment of the first palaces in Crete, phase IV in our developmental scheme, the period of the development of proto-urban communities comes to an end. Crete henceforward is the home of a civilisation. But during phase IV, developmental analogies to those seen in Crete occur elsewhere in the Aegean. It is necessary, therefore, to establish the culture sequence in these areas before considering the processes at work.

Chapter 7

Mainland Greece in the Third Millennium BC

As in Crete, and elsewhere in the Aegean, the early bronze age of southern and of central Greece is a time of awakening. At its beginning, at the end of the final neolithic period, the picture we have of the way of life is not greatly different from that of two or three millennia earlier. By its end there are clear indications of centralised organisation and of craft specialisation, especially in metallurgy, which herald the emergence of civilisation.

Civilisation, as documented by the formation of important religious or secular centres (such as palaces) and by writing did not, however, appear on the mainland at the close of the Early Helladic period. The impression which we have of the way of life of the middle bronze age is at present one of consolidation rather than dramatic change. And indeed while the Shaft Graves at Mycenae at the beginning of the late bronze age show enormous wealth, and its concentration in the hands of warrior princes, actual palaces are not well documented until the Late Helladic III period, from about 1400 BC.

None the less, the Early Helladic period, as in contemporary Crete, was one of major change, when the foundations of civilisation were being laid. The notion that Early Minoan Crete alone was responsible for the principal advances of the time is belied by an impressive array of finds in other regions. These will be surveyed in outline here. But first again it is necessary to define the cultural and chronological divisions employed.

The Early Helladic culture sequence

Wace and Blegen (1918) defined the Early Helladic period as broadly contemporary with the Minoan early bronze age. It was sub-divided in 1921 by Blegen into three groups to which periodic names were attached. They were subsequently redefined by Caskey (1960a). As originally suggested in 1965 (Renfrew 1965), for the reasons given above in chapter 4, I propose to use culture names for these bodies of material.

The geographical boundaries of the region in question are defined for us by the areal extent of the culture under consideration. Clearly the distribution of these cultures was

not a static one, but during the Korakou period at least it seems to have included all of the Peloponnese, Attica, Euboia and much of Boeotia, extending westwards to the Ionian Islands (cf. the distribution of 'sauceboats' in fig. 18.12).

THE EUTRESIS CULTURE

The Eutresis culture, a material assemblage first recognised by Blegen at Korakou (and designated Early Helladic I) remains disappointingly ill-documented today. Hetty Goldman's stratigraphy at Eutresis was largely confirmed by J. L. and E. G. Caskey at that site in 1958. In the earliest levels they unearthed final neolithic material (Groups I and II). Group I contained typical late neolithic pottery including matt-painted ware with characteristic shapes (Caskey and Caskey 1960, fig. 4, upper), together with fine black burnished ware and coarse ware, and a neolithic clay figurine.

Eutresis Group II contains these same fabrics, together with a new one, the Caskeys' 'heavy slipped and burnished ware', a characteristic fabric which as suggested in chapter 5 may be regarded as belonging to the final phase of the south Greek neolithic. A pinta-dera (stamp seal) was also found in this level.

With material of Group III are found the first buildings and pavements, and the red-slipped ware, singled out by Blegen as characteristic of Early Helladic I, is now seen (Goldman 1931, pl. v). The jug, or perhaps more accurately one-handed cup (Caskey and Caskey 1960, 140 and pl. 46), occurs with bowls and jars, and the neolithic wares almost disappear. Burnished monochrome ware, light coloured plain ware and coarse ware are also present.

In Groups IV and V the same ceramic wares are seen, with one-handed cups, bowls, jars, 'spoons' (little one-handed bowls or ladles) and the spout of an askoid vessel. Incised fine ware is a new element, with a fabric resembling the heavy slipped and burnished ware of Group III. The incisions are often filled with white colouring matter. This interesting incised pottery is mentioned again below and in Appendix 2.

The distribution of the culture is not altogether clear since it has been identified in homogeneous deposits only at Korakou, Eutresis, Palaia Kokkinia and Perachora-Vouliagmeni. The red-slipped ware has been found, however, at several sites in Attica, Boeotia and the north east Peloponnese, notably Zygouries, Asine and Corinth, and at Emborio in Chios. Isolated finds in the southern and western Peloponnese occur at Asea and Teichos Dhymaion, and at Kastri in Kythera. French also includes many Thessalian sites in his useful distribution map of this ware (French 1968, fig. 71).

THE KORAKOU CULTURE

The Korakou culture, or 'Early Helladic II', is well known from many south Greek sites for its characteristic thin-walled pottery, with lustrous surface, known as *Urfirnis*. It occurs in readily recognisable shapes, notably the 'sauceboat' (fig. 7.1, Caskey and Caskey 1960, pl. 49), the jug with long thin neck (*ibid.*, pl. 51, VIII.28), the askos (*ibid.*, pl. 49),

and the little footed bowl (ibid., pl. 50). Pyxides are also found (ibid., pl. 50) usually of lentoid shape. The stratigraphic succession is again well seen at Eutresis, where Groups VI–VIII provide ample material of this culture.

Burnished ware with incised and stamped decoration is still found, often with white infilling (fig. 11.6). An important feature of the Korakou culture, not adequately represented at Eutresis, is pottery with painted decoration. For this we must turn to what is

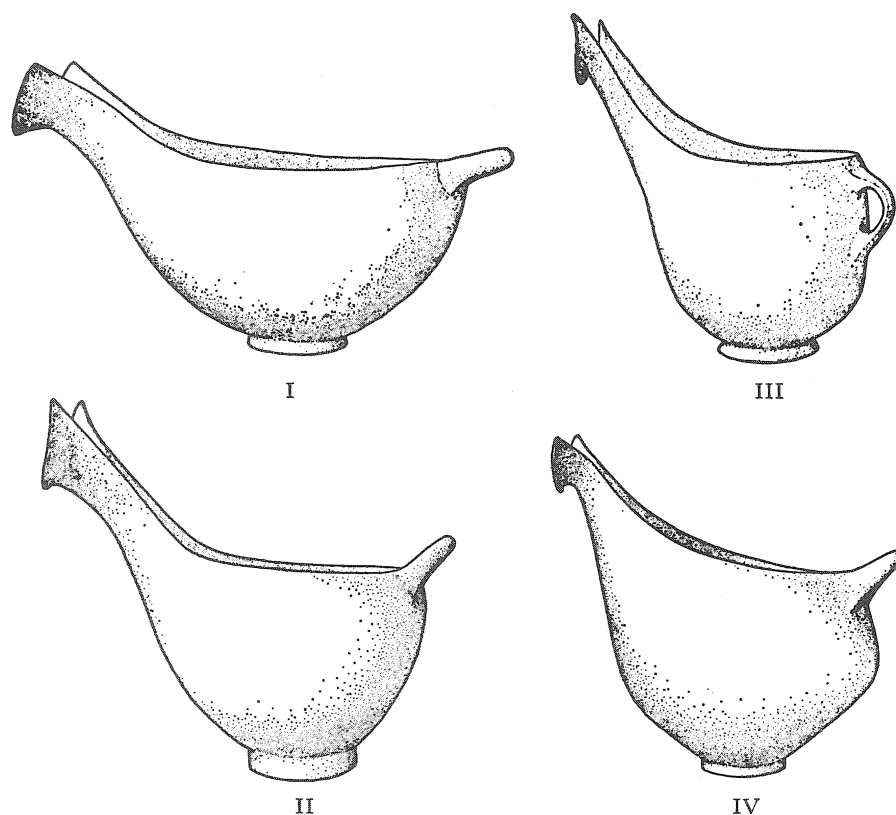


FIG. 7.1 Pottery 'sauceboats', the *Leitform* of the Korakou culture, from Lerna (after Caskey).

certainly the most important settlement yet excavated of the culture: Lerna, Stratum III. Here many of the characteristic *Urfirnis* shapes are found decorated with glossy dark paint (Caskey 1960a, 292): decoration and shapes are closely similar to those of the Keros-Syros culture of the Cyclades. The various important finds of this culture are summarised below. Its distribution is wide, covering the Peloponnese, Attica, Euboia and central Greece (Boeotia, Lokris, Phokis) extending west to Levkas. Most of the Korakou culture settlements suffered destruction by fire at the end of the period (although not Eutresis or Orchomenos), and Caskey has sought to connect this with the coming of a new population to the area (Caskey 1960a, 302).

THE TIRYNS CULTURE

At Lerna the important Korakou culture of Stratum III was overlain by deposits of Stratum IV with a different cultural assemblage. This made it possible for Caskey to define precisely, for the first time, the 'Early Helladic III' culture (Caskey 1960a, 293 f.), here termed the Tiryns culture. The term Early Helladic III, as used by all writers prior to Caskey's 1960 article, must be interpreted with caution, as it nearly always includes material of the Korakou cultural assemblage. Whether this is due to the difficulty of distinguishing the strata at some sites, or to the actual contemporary use of the material, is not yet clear. At any rate there is a clear separation at Lerna.

The two new and characteristic wares are dark-on-light patterned ware, and the light-on-dark ware with similar shapes and motifs known as Aghia Marina ware. The new motifs are entirely characteristic (Müller 1938, pls. xxxvi–xxxviii), so much so that a single sherd from Kritsana in Macedonia, and another from Pelikata in Ithaca, are at once recognisably of this ware (Heurtley 1939, 170, fig. 43 and 1934–35, fig. 20; Caskey 1964a, 23). The most important new shapes are the two-handled tankard (fig. 7.2; Goldman 1931, pl. VIII), small cups (Caskey 1955a, pl. 21, e–g) nicknamed 'ouzo cups', wide cups with out-turned rim (Goldman 1931, pl. IX, 4), two-handled bowls (Caskey 1960a, pl. 70, i), and various jar shapes (*ibid.*, pl. 70, j).



FIG. 7.2 Tankards of the Tiryns culture, from Orchomenos and Tiryns, painted with light-on-dark, and with dark-on-light decoration (*after Schachermeyr*).

An unexpected discovery at Lerna was that some of the pottery was made with the use of the potter's fast wheel (*ibid.*, 296 and pl. 70). This innovation, and the introduction of the handsome well-made grey pottery known as 'Minyan ware' were formerly thought to be distinctive signs of the Middle Helladic period in Greece. Both are now seen at Lerna IV with materials of the Tiryns culture. Incised and stamped ware are still found, and corded ware sherds (decorated when soft by the impression of twisted yarn) have been found at a few sites (Goldman 1931, 122, fig. 169).

The distribution of the Tiryns culture, as established by the characteristic dark-on-light painted ware, centres on the north-east Peloponnese, although there are sufficient finds in the centre and west to establish its presence in those regions (Asea, Malthi, Pelikata, Teichos Dhymaion). In Phokis and Boeotia, the light-on-dark fabric predominates, but the two distributions interpenetrate. There are finds also in Euboia (for instance at Lefkandi II) but surprisingly few in Attica. The distributions have been compiled and discussed by French (1968, fig. 78).

The considerable elements of continuity between the Tiryns culture and the Middle Helladic culture, which Howell (1970) would prefer to call the Minyan culture, leads him to regard them as successive stages in a single cultural development. He would thus term the Tiryns culture (i.e. 'Early Helladic III') the proto-Minyan phase of the Minyan culture.

THE LEFKANDI I ASSEMBLAGE

Recent finds at Lefkandi and other sites in Euboia suggest that the Tiryns culture ('Early Helladic III') was not the only cultural group in south Greece to follow the Korakou culture.

The Lefkandi finds showed that the site was first inhabited towards the end of the early bronze age. The Phase I finds there contain a significant proportion of wheel-made plates (Popham and Sackett 1968, fig. 7, 1 and 2), ouzo cups, in shape like those of the Tiryns culture at Lerna (ibid., fig. 7.5), one-handed cups continuing the Korakou culture tradition, and a two-handed cup. It is clear that these finds are distinct from, and later than, the Korakou culture (in fact a couple of sherds possibly of *Urfirnis* ware were found), but despite some resemblances with Lerna IV, they cannot be assigned to the Tiryns culture. It is not until Phase II at Lefkandi that the Tiryns culture painted ware and the early Minyan ware (or 'proto-Minyan') is seen. Lefkandi II can be equated with the developed stages of the Tiryns culture, as seen at Lerna IV. Lefkandi I may well belong chronologically between the period of Lerna III and Lerna IV.

Certain other finds in Euboia suggest that some of the sites without Tiryns culture finds were not necessarily uninhabited at the time of its *floruit* in the Argolid. The graves of Group III at Manika in Euboia (Papavasileiou 1910), in addition to their many Cycladic affinities (discussed in Appendix 2 below) have certain specifically north-west Anatolian similarities (fig. 7.3). The beaked jugs with a cut-away spout (Papavasileiou pl. Z', 2; pl. Θ') in particular have good Troy IV parallels (Blegen et al. 1951, 9 and 110), and some of the incised ware (notably Papavasileiou 1910, pl. Z', 1) has affinities with material from Iasos. Various finds, such as metal tweezers and one-handed cups, link the Manika tombs with the Korakou culture, but sauceboats and many other Korakou culture finds are missing. Yet the Korakou culture is well represented at the settlement of Manika (Theochares 1959a, 296, fig. 15), and a possible conclusion is that many of the Manika tomb finds are later than this date. Indeed Jacobsen has drawn attention to a wheel-made cup, found in Tomb V of Group III at Manika, which has Middle Helladic

parallels (Papavasileiou 1910, pl. H, top row, left; cf. Sackett et al. 1967, 89). The obvious conclusion is that the Manika Group III graves lie in date between the Korakou culture and Middle Helladic, and perhaps contemporary with the Tiryns culture, a conclusion supported by the Troy IV parallels with the Tiryns culture at Lerna (Caskey 1960a, 297).

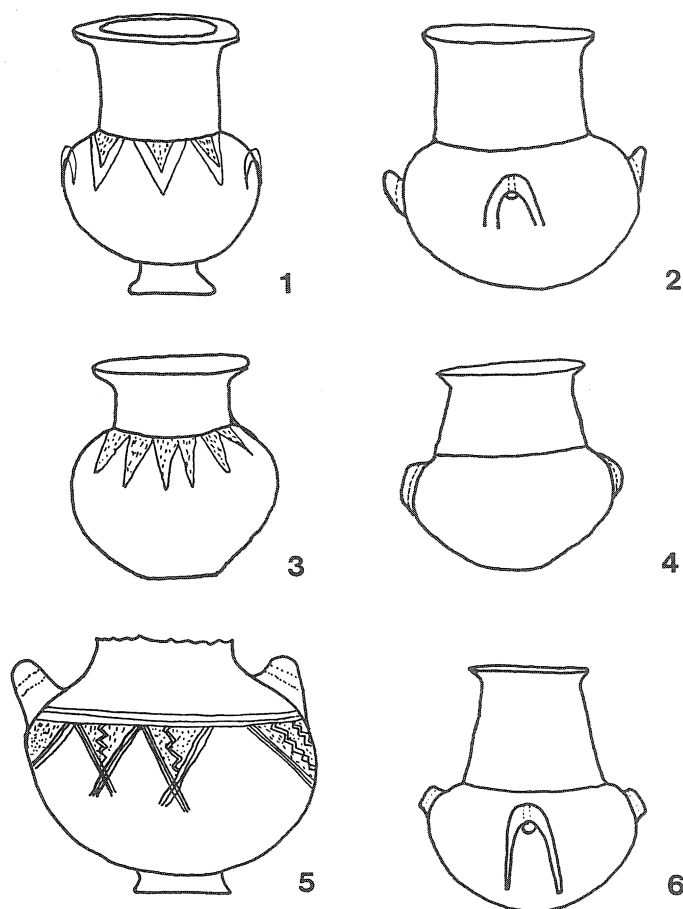


FIG. 7.3 Related pottery forms of Poliochni (1–2), Manika (3–4), and Iasos.
Not to scale.

The settlement at Manika has likewise yielded no Tiryns culture material, although there are plenty of finds of the Korakou culture. David French has convincingly shown (1966, 49; 1968, 62) that various finds from the settlement there, like those of Lefkandi I, are later than the Korakou culture and at least partly contemporary with the Tiryns culture: they have several Anatolian (Troy III–V) affinities.

At Aghia Irini on Kea a similar situation holds: the Korakou culture is well represented, yet the Tiryns culture is not, although finds like those of Lefkandi I (Caskey

1964b, 320 and pl. 49a), with Anatolian resemblances (French 1967b, 36), have been made.

The Lefkandi I assemblage is thus seen at other sites in Euboia, specifically Manika, and similar finds at Aghia Irini in Kea overlie the Korakou culture levels. Related finds from Syros have been termed the Kastri group. The Lefkandi I assemblage is as yet insufficiently investigated to be designated a 'culture'. Doubtless further finds will be made in due course, notably in Euboia. The complex of finds is clearly in part of Anatolian inspiration.

THE MIDDLE HELLADIC CULTURE

The Middle Helladic culture, which succeeds the Early Helladic cultures, is well characterised by its pottery. The ceramic evolution has been studied in detail by Roger Howell (1970). The most characteristic features are the various classes of Minyan ware (grey Minyan, yellow Minyan, red Minyan, Argive Minyan), amongst which the pedestal bowls or goblets, and the bowls and jars with angular profiles are notable (Goldman 1931, pl. X, and pp. 136–44). Matt-painted ware is another striking innovation, with a wide range of form and decoration (Buck 1964; Goldman 1931, pls. XIII–XV), and incised and stamped wares persist. The identification of the Middle Helladic assemblage thus presents little problem, although Howell regards the Tiryns culture as actually a first phase, proto-Minyan, in the development of this Minyan culture.

The Eutresis culture

The distinguishing ceramic characteristics of the Eutresis culture were defined above, and its distribution indicated by that of red-slipped ware bowls.

Well-stratified remains are known only from three sites at present, and our information about structures comes from two of these. The settlement at Lake Vouliagmeni at Perachora (Fossey 1969) was possibly surrounded by a circuit wall, which was later superseded by an earth bank with stone revetment walls on each side, and standing to a height of 2 m. This has so far been found at only one part of the site, so that its extent and purpose are uncertain. The buildings in the lower levels seem to have curvilinear walls.

At Eutresis the excavations by Goldman revealed the stone foundations of a rectangular house measuring 7.3×4.3 m (fig. 7.4; Goldman 1931, fig. 8). This must be viewed as the south Greece counterpart of the Burnt House at Sitagroi in Macedonia (fig. 7.8). The difference in constructional techniques in the two regions is well brought out by the comparison. It should be noted, however, that the finds included a 'sauceboat', and the building is late in the Eutresis culture or may even belong to the Korakou culture. The Caskeys' excavations at Eutresis produced similar although incomplete remains from Group V there (Caskey and Caskey 1960, fig. 9), with a series of well-laid pebble pave-

ments in the courtyard. Part of a circular wall, some 6 m in diameter, was also found enclosing a deep shaft, 'the chasm', whose purpose is unknown (*ibid.*, 137, fig. 5). No burials are yet known from this culture.

The defining ceramic features of the culture have been discussed above. In addition to the Eutresis and Perachora finds, mention should be made of those from Palaia Kokkinia near Piraeus, where Eutresis culture pottery was found, including some spherical pyxides, and sherds with a decoration of stamped concentric circles (Theochaes 1952a). Such sherds are regularly found as part of the Eutresis culture assemblage, and have been likened to the frying pans of the Keros-Syros culture. But both the form, as

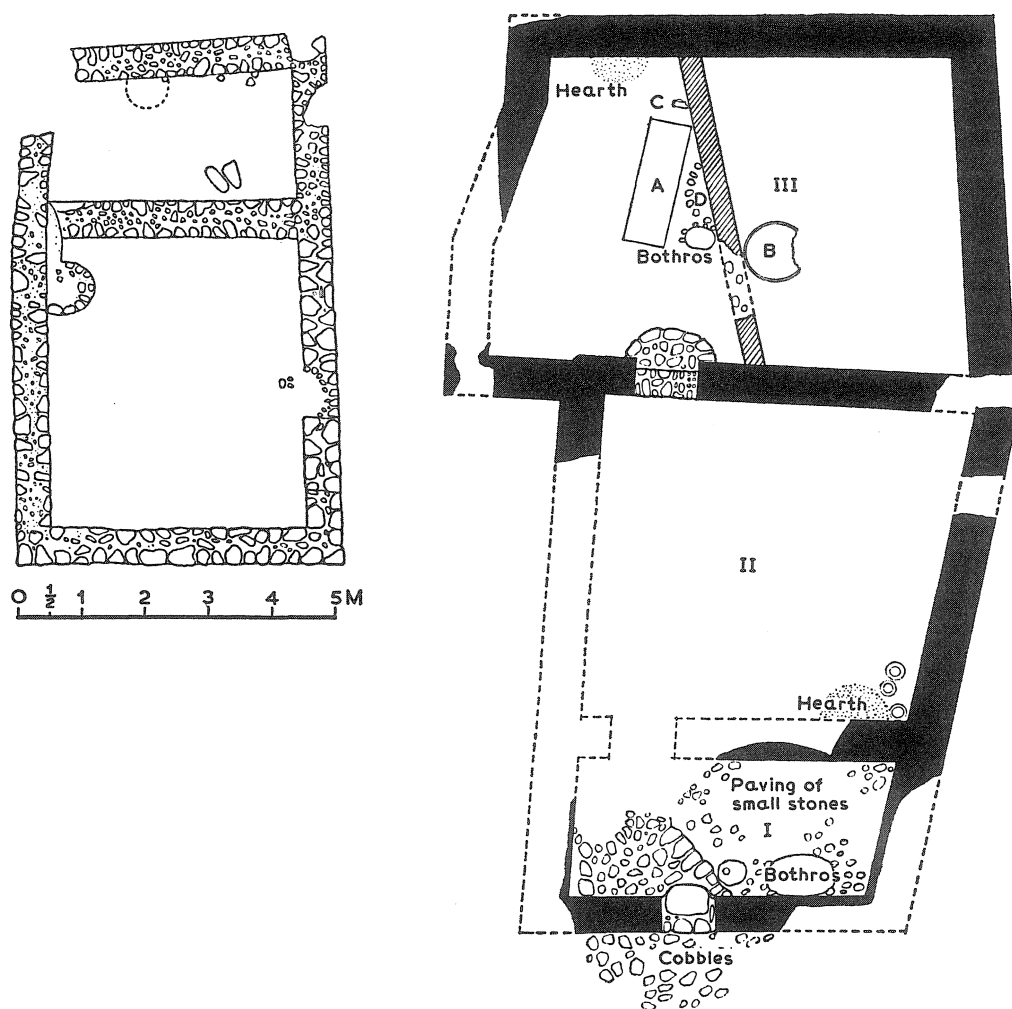


FIG. 7.4 Houses of the Eutresis culture (*left*) and the Korakou culture (*right*) at Eutresis (*after Goldman*).

discussed in Appendix 2, and the decoration (Bossert 1960) distinguish the mainland sherds from the later Cycladic ones. The similarity is evident, but there is no need to think of these Helladic sherds as Cycladic imports.

The further repertoire of finds of the culture is unimpressive: there are stone querns, flint and obsidian blades, bone tools, clay spools, whorls and other objects, including numerous loom weights at Perachora-Vouliagmeni. A single metal object, a flat chisel, has been found in a context probably of this period—from House I at Eutresis (Goldman 1931, fig. 286) (although the presence there of Korakou culture pottery was noted above). The material assemblage is thus rather undistinguished, lacking the variety seen in the next cultural phase.

The origins of the culture seem to lie in the preceding final neolithic. The pottery finds of Groups I and II at Eutresis may reasonably be seen as precursors of the Eutresis culture ceramics of Group III: this is the conclusion reached by French (1968, 62).

The Korakou culture

The Korakou culture ushers in a new era in the cultural development of mainland Greece. At this time the number of known settlements is greatly increased in both Attica and the Peloponnese, the essential homeland of the culture. The nature of the settlements changes markedly, and cemeteries are now widely found. Above all there is a marked increase in the connections and relations which the culture has with other areas in the Aegean, an increase related to, and enhanced by, the range of metal types now seen. This is the decisive phase for the emergence of civilisation in mainland Greece: until this time the culture was essentially neolithic—farming villages where subsistence was the main economic concern. From now on further occupations develop, and measurable wealth may be recognised. Not until the period of the Shaft Graves of Mycenae is a comparable increase in the wealth and variety of the material culture seen.

Here only a few of the main features of the settlements, cemeteries and material culture will be listed. The more significant developments are discussed again in later chapters.

SETTLEMENTS

The distribution of settlements of the Korakou culture is indicated approximately by the find spots of 'sauceboats' in mainland Greece (fig. 18.12). It is centred upon the Peloponnese, with 74 sites in French's (1968) catalogue, and Attica, with 29 sites, as compared with 20 and 7 known sites respectively occupied in the time of the Eutresis culture. The main concentration of sites is still in the eastern Peloponnese, although the west is now more densely populated than previously.

This is the time when several fortified sites are seen (fig. 18.11). The semi-circular bastions at Lerna (pl. 20, 2) compare with those of Chalandriani in Syros. Askitarío,

Raphina and Manika were likewise fortified, and the walls of the Early Helladic settlement at the Apollo Temple in Aegina may date back to this period.

Two further developments are important: the first is the existence of large, and presumably public, buildings. The finest of these, the House of the Tiles at Lerna (fig. 7.5; pl. 20, 1) has been completely excavated: it was preceded there, still within the span of the Korakou culture, by a similar building at a different orientation. The House of the Tiles is rectangular in plan, measuring 25 m by 12m, and the building was divided into several rooms, with corridors and stairways leading to an upper storey. The walls were of square mud bricks, with stone socles, and the edifice was roofed with stone and terracotta tiles. The walls were plastered on the inside. Within this building was found an important deposit of clay sealings which had sealed jars and boxes.

Secondly, at Tiryns, the large but only partially excavated 'Rundbau', an impressive circular building, is of comparable size (fig. 7.5, lower). It too was roofed with terracotta tiles.

Some of the settlements at this period may reasonably be regarded as small towns. Part of the settlement at Aghios Kosmas is seen in fig. 6.4; it is of agglomerate plan, and very different from the single houses, standing rather widely spaced, such as are apparently still seen at Eutresis (Goldman 1931, fig. 13). At Zygouries, once again, we obtain a vivid impression of a compact settlement on the agglomerate plan. The mound measures 150 by 50 m, and in the areas tested was found to be occupied by a cluster of stone foundations (Blegen 1928, 5 and pls. I and II): 'It is evident that the establishment or village as a whole consisted of numerous small dwellings set close together and separated by narrow crooked streets or alleys. One such street was traced for more than 10 metres....' Blegen went on to describe the settlement as follows: 'The dwelling houses at Zygouries are for the most part small and apparently of no standardised shape, though all are rectangular in design and regularly composed of two or more rooms. What seems to be a constant feature in almost all is the tendency to make the chief inner chamber roughly square in plan; indeed, this inner square room, sometimes small, sometimes relatively large, may be taken as one of the characteristic marks of these Early Helladic houses. In some cases there certainly was a fixed hearth in the centre of the room; in others no trace of any such arrangement could be recognised. The outside door in three cases, where satisfactory evidence of its position was preserved, led into the smaller of the two rooms forming the house, and in all three instances was placed on the long side of the building. The roof was undoubtedly flat; no trace of columns was found, and no column bases came to light, but it is possible that wooden supports were used where necessary. No rule of orientation was observed; since the houses appeared to have stood in groups or blocks formed by intersecting streets and lanes, these latter must have been the determining factor in the orientation of the buildings. There was some slight evidence for the use of party walls; but perhaps the two houses thus connected were not entirely independent dwellings. In a few instances it looks as if the houses faced an open court, which may have been surrounded by a wall.' Large pithoi

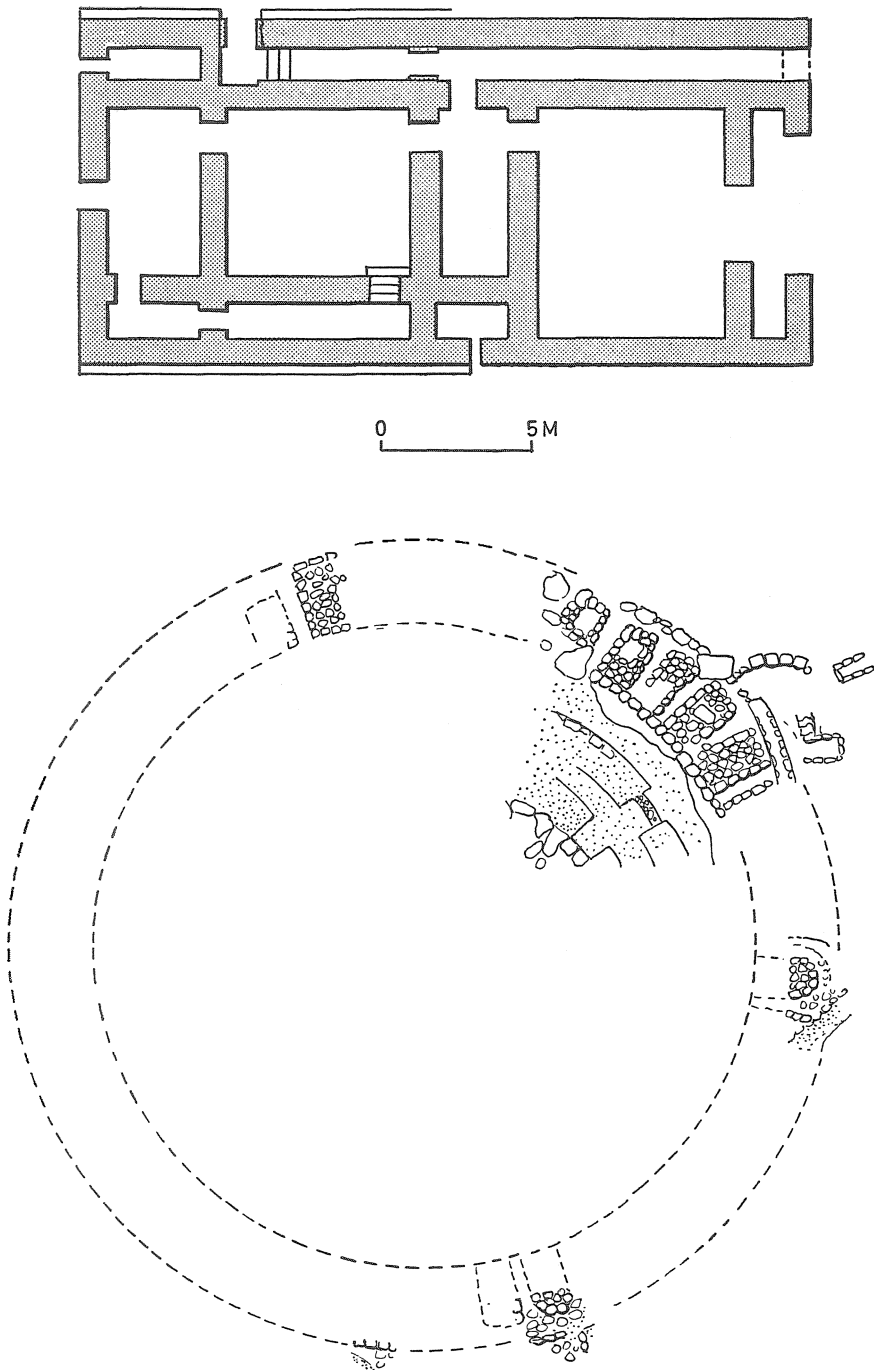


FIG. 7.5 Major buildings of the Korakou culture: the House of the Tiles at Lerna, and the 'Rundbau' at Tiryns.

were found in several of the rooms, and the site gives a very clear impression of a fairly typical settlement of the time.

A rather different picture is given by the finds at Orchomenos where the 'Rundbauten' probably belonged to this period (Bulle 1909, pl. IV). These are circular structures, whose stone foundations are preserved, of up to 8 m in diameter, the smallest having an interior diameter of 2.50 m. Their purpose is uncertain but they are so numerous that they should probably be regarded as dwellings.

CEMETERIES

Burial during neolithic times was generally intramural—that is to say in graves within the settlement, whether inside or outside the houses. The practice of intramural burial certainly continued during the Korakou culture: at Aghios Stephanos in Lakonia adults and children were buried in simple pit graves within the settlement, and this was a particularly common practice for child burials. Often the bones of a child were set inside a pithos (Frödin and Persson 1938, 42 and 212) following a custom seen already at Kephala in Kea in the final neolithic.

There are, however, three significant new forms of burial during this period. The first is that of the cist-grave cemetery, seen most clearly at Aghios Kosmas (fig. 19.10, 4; Mylonas 1959) where numerous cist graves, both of slabs and built of small stones, contained multiple burials. The similarity with the Cycladic cemeteries is an obvious one, and since these are already numerous in the preceding Grotta-Pelos period, a Cycladic origin seems likely. This is supported by its distribution, which is principally in Attica, although cist graves at Elaphonisos, off the southern tip of the Peloponnese, may be of this period also. An important cemetery has recently been discovered near Marathon.

Secondly there is the remarkable cemetery at Steno in the plain of Nidri in Levkas (fig. 19.11; Dörpfeld 1927). This was an extensive cemetery of 33 built circular platforms of stone, surmounted by tumuli, each containing one or more burials in pithoi or small cists. The dead were burned, although often incompletely, and many of the finds were damaged by fire: some of the goods were found in the traces of the pyres on the platforms rather than inside the pithoi or cists. The finds were extremely rich, including a series of metal weapons—daggers and spearheads mainly—closely similar to those of the Aegean itself (figs. 18.2 and 18.3). The 'sauceboat' finds and the other pottery lead one to place this cemetery in the Korakou culture. This has been questioned by some writers, but the series of graves in question, the 'R graves', unlike others on the island, contains nothing that has to be of later date. It is possible, however, that the Korakou culture persisted at Steno with little change until the beginning of the Middle Helladic period. Although nothing has been found elsewhere quite like these Levkas graves, the final neolithic graves at Kephala were likewise covered in several layers of stone, forming cairns of small size.

The third new burial form is the rock-cut tomb (fig. 7.6). Already as we have seen above, rock-cut chambers at the bottom of a shaft grave were dug in final neolithic

times, in the Athenian Agora (Shear 1936). This may be regarded as the prototype for two similar tombs at the bottom of a shaft at Corinth (Heermance and Lord 1897). The graves contained either one or two skeletons each, and the jugs and ring-footed bowl place the finds within the Korakou culture. The cemetery at Zygouries may perhaps be classed with these, for the graves are dug in the rock, although not at great depth. Like all these cemeteries it is certainly extramural. Some of these graves contained several burials (Blegen 1928, 44)—Tomb VII at Zygouries had perhaps fourteen burials, and Tomb XX had fifteen. But these, like the Aghios Kosmas cist graves, should be regarded as instances of multiple burial, perhaps of a family, rather than of collective burial of

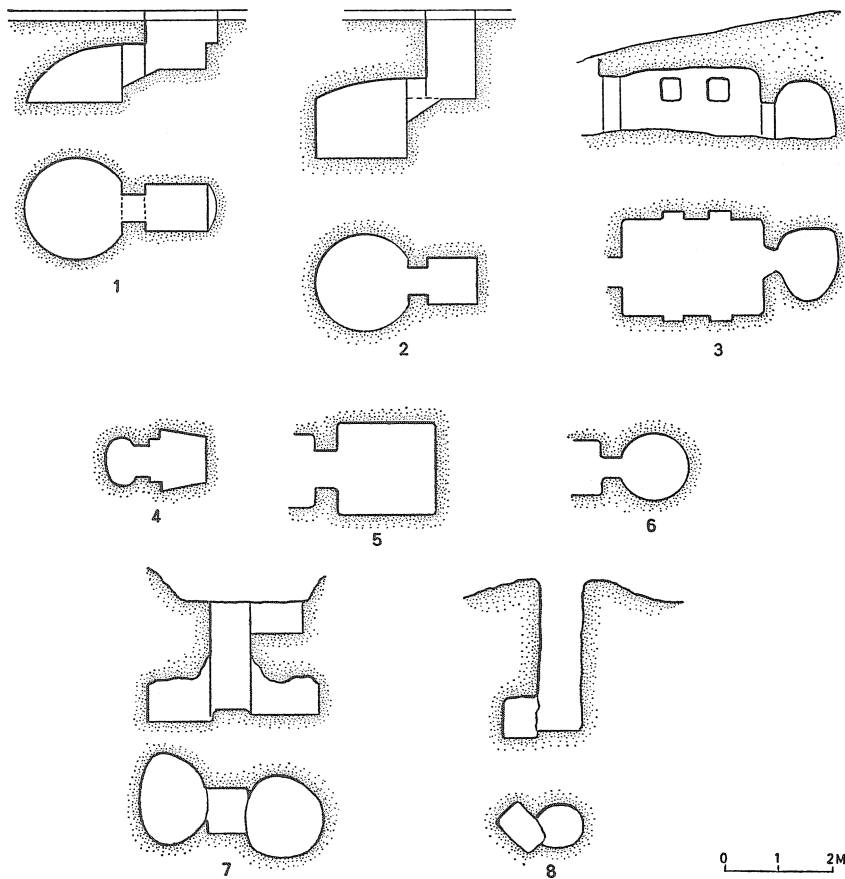


FIG. 7.6 Aegean rock-cut tombs of the third millennium bc.
 1. Manika in Euboia, tomb 1 of group 1 (Early Bronze 2 or 3);
 2. Manika in Euboia, tomb 11 of group 1 (Early Bronze 2 or 3);
 3 to 6. Phylakopi in Melos (Phylakopi I culture);
 7. Corinth (Korakou culture);
 8. Athens Agora (final neolithic).

a large group such as is seen in the Mesara tombs of Crete. The earlier of the rock-cut tombs at Manika may also be of this time.

MATERIAL CULTURE

The pottery of the culture has been briefly discussed. Mention should be made, however, of further shapes and features beside the ubiquitous *Urfirnis* and its *Leitformen*: the 'sauceboat', saucer and askos. In the fine wares the jug is also a common form, together with the narrow-necked jar. Dark-on-light painted ware, very similar in general appearance to that of the Keros-Syros culture is seen: the fabric is fine, and the decoration neat and rectilinear. Painted jugs occur, for instance, at Askitarío (Theochares 1954a, fig. 6), and painted 'sauceboats'—with which that of Spedos in Naxos (fig. 15.7, 5) may be compared—are seen at Aghios Kosmas, Eutresis, Lerna, Raphina and other sites.

Large pithoi are frequently found. A feature of special interest is the roll stamp with which these were decorated—there are good examples especially from Tiryns and Lerna (Wiencke 1970). At Lerna also a magnificent hearth was found, with impressed decoration (pl. 20, 3).

Vessels in stone are not common, but marble bowls, sometimes like those of the Cyclades, do occur especially in Attica and Euboea (e.g. Blegen 1928, pl. XXI, 7 and 8, and figs. 184 and 185; Mylonas 1959, figs. 164 and 165). A two-handled cup of grey marble, in form like the squat *depas* cup of Troy was found at Lerna (Caskey 1956, pl. 47, i and fig. 4). A feature of note on many sites is the small, beautifully worked pestle or grinder of fine stone (e.g. Blegen 1928, 196, fig. 186). Marble folded-arm figurines of Cycladic type occur at several sites (fig. 20.5). There are several marble figurines of forms related to those of the Cyclades at Aghios Kosmas (Mylonas 1959, fig. 163). In general, however, figurines are not common: the only distinctive mainland type is the narrow cone figurine, examples of which were found at Zygouries, Tiryns, and in Tiryns culture levels at Lerna (Blegen 1928, 187, fig. 177; Müller 1938, pl. XXV; Caskey 1956, pl. 47). There are other occurrences of less standardised form: a flat clay torso, neatly decorated in the Korakou culture painted style, was found at Lerna (Caskey 1955a, pl. 22, j and k). Clay animal figurines also occur at Corinth, Eutresis, Tiryns, Zygouries and other sites.

Stone beads and pendants of various forms occur. One of the most notable, of green-stone with relief spirals, from Asine, has resemblances with the carved steatite bowls of Early Minoan II Crete and the Keros-Syros culture (Frödin and Persson 1938, 241). Foot amulets were found at Aghios Kosmas and Zygouries (Mylonas 1959, fig. 116, 14; Blegen 1928, pl. XX, 3). But of especial importance are the sealstones, and the sealings. A sealstone from Aghios Kosmas (Mylonas 1959, fig. 166) is apparently of Minoan form, and may actually be an import from Crete, but this need not be the case for the two from Asine and Raphina (Frödin and Persson 1938, fig. 172, 1 and 3; Theochares 1953, fig. 15). Clay seals also occur—there is a fine example at Zygouries—and the style of most of these engraved seals is similar to that found on the numerous seal impressions from Lerna, and from Asine (fig. 7.7; Blegen 1928, pl. XXI, 4; Heath 1958; Frödin and Persson 1938, fig. 172).

Stone tools include the usual rubbers, grinders and polished flat axes, as well as numerous blades and scrapers of flint and obsidian. Hollow-based arrow heads of obsidian apparently make their appearance at this time, although they are not common. Two fine examples occur at Aghios Kosmas, and there is another from Zygouries (Mylonas 1959, fig. 166, 17 and 18; Blegen 1928, pl. XX, 23).



FIG. 7.7 Clay sealings (seal-impressions) from the House of the Tiles at Lerna (after Heath). Scale c. 3 : 4.

The bone tools include a wide range of spatulae, scrapers, points and pins. Of particular note is a dagger pommel of bone from Zygouries (Blegen 1928, 191, fig. 180) and from this site and from the Tiryns culture at Lerna come distinctive and neat toggle pins (Blegen 1928, fig. 181, 10; Caskey 1956, pl. 47, a and f). Bone tubes, generally with incised decoration, which resemble those of the Keros-Syros culture at Chalandriani in Syros occur at Lerna, Manika and especially Levkas (Caskey 1954, 27; Papavasileiou 1910, 17; Dörpfeld 1927, Beilage 61, 4a and b).

The terracotta tools include the usual spindle whorls, and mention should be made of the clay anchors which are first seen in the Korakou culture, for example at Eutresis and Raphina (Goldman 1931, fig. 269; Theochares 1951, fig. 19), although they are more common in the succeeding phases.

A particularly important feature of the culture is the wide range of metal types which are found. The metallurgy of the period is discussed in chapter 16, but the major types may be indicated here. The hoards from Eutresis and Thebes indicate the range of tool types (Goldman 1931, fig. 287; Platon and Stassinopoulou-Touloupa 1964, 89 and fig. 5). Flat axes and chisels are the most common forms, but shaft hole axes, including axe-adzes certainly occur. The rich graves at Levkas document most of the other types which occur. The most important are the daggers, generally with a midrib and two or four rivets (fig. 18.3), and there are slotted spearheads. Simple flat, short daggers also occur. Awls and borers are, of course, common and there are in addition some knives.

The graves at Zygouries and especially Levkas document the range of more fancy items: spatulae, possibly for cosmetic purposes, tweezers (in silver at Manika), gold ear-rings and beads (which at Levkas are in a distinctive beaten gold technique), and bracelets and pendants of silver. Metal vessels are documented by the gold 'sauceboat' from Arkadia (pl. 19, 3) and perhaps the bowls in the Benaki Museum (Childe 1924, 163; Segall 1938, pls. 1–3).

This brief outline summarises only some of the principal features of the material finds of the Korakou culture. Its great significance in the development towards Aegean civilisation is emphasised again in Part II.

The origins of the culture have been disputed: it was once felt that the Korakou culture, perhaps like its predecessor the Eutresis culture, was the result of immigration to Greece by people from the east Aegean. But its resemblances with the cultures of west Anatolia are best explained by trade and contact. It is significant that at Eutresis, the only site where the transition from the Eutresis to the Korakou culture is well documented, it seems to be a gradual one.

The Tiryns culture

The defining ceramic features of the Tiryns culture have been set out above. Known sites are much less numerous than for the Korakou culture, and indeed occur in about the same numbers as those of the Eutresis culture—but this may in part be due to the

ease with which the typical *Urfirnis* 'sauceboat' sherds of the Korakou are recognised, even in weathered condition, on the surface of settlement sites.

Finds have been made in the Peloponnese, Attica, Euboia and central Greece, although there is some variation, since in central Greece the predominant decorative painted style is light-on-dark, and in the Peloponnese the converse is true. A complicating factor also is the presence in Euboia, and perhaps in Attica, of the Lefkandi I assemblage: it seems quite possible that these two distinct cultural groups coexisted in central and southern Greece for at least part of the Early Bronze 3 period. Well-stratified finds of this new assemblage come, however, only from small soundings at the type site, and although the Aghia Irini and Manika finds confirm its existence, our information about the Lefkandi I assemblage is at present restricted essentially to the pottery.

Many sites which in the older literature are termed 'Early Helladic III'—such as Aghios Kosmas for instance—must now be regarded as belonging to the Korakou culture. Well-stratified deposits of the Tiryns culture are best seen at Lerna and Eutresis, and the finds from Tiryns and Aghia Marina are important. Our knowledge of the architecture comes effectively from Eutresis and Lerna. At Eutresis again, House H (Goldman 1931, 21, fig. 17) is altogether very similar to the Eutresis culture House I, already described, at the same site. It is in plan a narrow rectangle, nearly 6 m in width, with a large central room and a short room of the same width separated from it by a partition wall. There was a central column of mud brick (*ibid.*, 25).

The houses of Lerna IV are of a different kind (Caskey 1966), and the settlement does not resemble the fortified one of Lerna III. Where the House of the Tiles had been, a low circular tumulus, 19 m in diameter, was raised and was left without buildings, enclosed by a ring of stone. The houses are now apsidal—like the Burnt House at Sitagroi (fig. 7.8), or indeed those of final neolithic Rachmani in Thessaly (Wace and Thompson 1912, fig. 17). This became the most frequent building form in Middle Helladic Greece. In the first phase of the Tiryns culture at Lerna these were timber frame houses, which are unusual in southern Greece. By the third phase the foundations were, as usual, of stone. There was no find of a large building at this period to compare with the House of the Tiles, or the Tiryns 'Rundbau'.

So far there is little documentation for the burial practices of the time. Two child burials were found within the settlement at Lerna (Caskey 1955a, 37), and there may have been a cemetery at Thebes. But we know that the Lefkandi I assemblage was also flourishing at about this time, and many of the Manika rock-cut tombs must be contemporary with the Tiryns culture. It is not impossible that the Korakou culture continued into the Early Bronze 3 period at some sites, and with it its burial practices.

The material culture gives less evidence of variety than that of the preceding period. There are in general fewer rich finds. The elements of continuity are striking. At Lerna, for instance, there are cone figurines (Caskey 1956, pl. 47, j and k) which continue the type previously seen at Zygouries, and clay anchors (*ibid.*, pl. 47), seen also at Berbati, which find precursors at Raphina and Eutresis.

Among new forms are the bone toggles seen at Lerna and Zygouries (ibid., pl. 47, a and f; Blegen 1928, fig. 181, 10), where the context is, however, uncertain. Of great interest is the bossed bone plaque from Lerna IV, which has counterparts in the west Mediterranean (Evans 1956).

Fewer metal objects have been found, but this may simply reflect the small number of excavations with stratified deposits of the period—and may also be influenced by the late date of recognition of the culture. There is a dagger from Lerna, and a knife from Eutresis (Caskey 1955a, pl. 23, a; Goldman 1931, fig. 286, 7), and it should be noted that the R graves of Levkas may have continued in use well into the Early Bronze 3 period although the finds are still of the Korakou culture. The dagger from Aghia Marina is probably of this period (Sotiriades 1912, 276, fig. 15).

In general then the culture is less strikingly wealthy than its predecessor, and certainly the rate of innovation and of change has decreased markedly. The origins of the Tiryns culture are not clear. At Lerna and many other sites, the Korakou culture occupation seems to have ended by fire. And on present evidence, even at Eutresis, where there is no destruction, the transition from Korakou to Tiryns culture was apparently a discontinuous one. If, however, this culture has no apparent clear antecedents in the area of its most marked development, neither has it any outside that area. But certainly the change from Korakou culture to Tiryns culture in south Greece seems more marked than any other subsequently seen in Greek prehistory, or any previously documented since the development of farming life.

The third millennium BC in Thessaly

The Thessalian early bronze age is less well understood than that of southern Greece, since there has not been the same intensive exploration, and much recent work has focused on the rich neolithic period of the area. The excavations of Milojević at Argissa have given a division into three periods.

The final neolithic Larissa and Rachmani cultures, according to Milojević's observations (1959, 26), do not overlap with the Early Thessalian at all. In the earlier two periods of the early bronze age at Argissa, the material came from fortification trenches, while two building levels were observed in the third. These levels have been termed Early Thessalian I, II and III by Milojević. But of course the relation of these periods to those in other areas of the Aegean is a separate problem.

The Early Thessalian I material, from the earlier fortifications trenches, contained no imported *Urfinis* ware. The pottery was burnished undecorated ware, including bowls with incurved rims like those of Troy I. Lug and tunnel handles occur. Shallow cups with high handles are prominent (Milojević 1959, fig. 21, 11–13), recalling those of Phase IV at Sitagroi, and of the Eutresis culture at the eponymous site. Of especial interest are the finds of corded ware, including the typical 'Fischplatten' so common in the Cernavoda-Ezero culture of Bulgaria (ibid., fig. 21.2).

French, however, prefers to regard the material from these levels (classified by Milošević as Early Thessalian I) as of the Early Bronze 2 period. Thessalian Early Bronze I would then be defined by the same ceramic assemblage as characterises the Eutresis culture. French has collected much relevant material at no fewer than 45 Thessalian sites (French 1968, 68): it may be equated with what Milošević terms Early Thessalian Ia, although this is not seen at Argissa.

In Early Thessalian II the striking cups with high-swung handles are absent. On the other hand there are high-handled deep cups, which Milošević (1959, 27) links with the Baden culture, but which could relate equally to the high-handled cups of Troy IV and V (Form A33: Blegen et al., 1951, II, 2, fig. 187). *Urfirnis* ware is now common, and Milošević equates this phase with the fully developed Korakou culture of Boeotia.

In the Early Thessalian III phase, bowls with 'T'-shaped rims, already seen in Early Thessalian II, are numerous. They resemble somewhat the Troy shape A21 which makes its appearance in Troy II, the 'T' rim developing in Troy III. Two-handled cups with high handles make their first appearance (Milošević 1959, fig. 23.7), resembling somewhat those found in the third settlement at Armenochori in Macedonia (Heurtley 1939, 193). Milošević reports that *Urfirnis* ware is still common. On the other hand, the presence of clay anchors is without chronological significance.

Houses were built of clay or mud bricks, and no plans have been published for Argissa. Early Thessalian finds have come also from Tsani (Wace and Thompson 1912, figs. 86, c–g, and 88). At Zerelia three clay figurines may belong to this period. The painted ware of Lianochladhi III (ibid., figs. 125–30) has similarities both with that of the Tiryns culture and with Middle Helladic matt-painted ware. Since it occurred with Minyan ware goblets it should probably be attributed to the later phase.

Relatively little is thus known about this period in Thessaly: unfortunately the stratigraphic sequence for the end of the neolithic is uncertain on many sites, and there is sometimes doubt as to whether finds should be considered as neolithic or early bronze age.

The Thessalian finds present a number of chronological problems—for instance the occurrence of corded ware in Early Thessalian I levels, while it is attributed to the Tiryns culture at Eutresis. At present it is not easy to correlate the sequence with that of southern Greece. Re-excavation at a key site such as Lianochladhi or Orchomenos might be decisive here. But clearly the paucity of finds and the scarcity of metal are not coincidental.

Life in Thessaly during the early bronze age does not seem to have been markedly different from that of the late neolithic period.

The third millennium BC in Macedonia

The material from Macedonia is more abundant than is at present the case for Thessaly. In central Macedonia (Chalkidiki) the mound of Kritsana has yielded a stratigraphic

sequence of six settlements, between which there is almost complete continuity in the ceramic finds (Heurtley 1939, 17).

In the earliest two levels some neolithic painted ware is still seen, and bowls with incurved rims, like those of Troy I, are common. Horizontal trumpet lugs are common in these levels, and clay anchors and hooks have been found. In levels III and IV these types are less conspicuous: globular bowls with narrow mouths are frequent (*ibid.*, fig. 40, h and j). The potter's wheel was already used in phase III, although for only a small proportion of the pottery (*ibid.*, 80, n. 1). This may perhaps be contemporary with its first use in Troy in settlement IIb, and presumably earlier than its appearance in south Greece in the Lefkandi I assemblage and the succeeding Tiryns culture. Finally in phases V and VI bowls with flattened rims (like the 'T'-rim of Early Thessalian II and III) are frequent, and loop handles are more numerous than tunnel lugs. Ledge lugs are also common. Jugs are found. Of great importance also is a single sherd, from level VI at Kritsana which is of Tiryns culture painted ware (Heurtley 1939, fig. 43). It seems clear, therefore, that Kritsana spans the period from Troy I to V, corresponding to the Eutresis culture/Tiryns culture time range. It does not follow, however, that the early bronze age occupation at Kritsana started early in the Troy I period.

Other sites in west and central Macedonia have a longer duration: the two-handled tankard of the third settlement at Armenochori is probably of middle bronze age date, and may relate to the Balkan series rather than to those of Troy.

Although the early bronze age finds of west and central Macedonia cannot yet effectively be sub-divided into phases, they give a clear picture of a fairly homogeneous assemblage. The stone tools include numerous stone shaft-hole axes and maces from various sites (Heurtley 1939, fig. 199), types not reliably dated to the early bronze age of south Greece, apart from an example at Korakou culture Lerna (Caskey 1956, 168). As in the south, hollow based arrowheads make their appearance at this time (Heurtley 1939, fig. 65, x-z). The clay objects include spindle whorls, and clay anchors and hooks. At Kritsana, clay anchors are found already in the first settlement, which may be their earliest appearance in the Aegean. The metal finds are limited to copper pins and a gold hair ring from Saratse (*ibid.*, fig. 67, qq).

Recent excavations at Sitagroi in east Macedonia have given for the north Aegean a controlled stratigraphic sequence, with a quantitative study of pottery. As described in chapter 5, the ten metre stratigraphy has been divided into five phases, of which phase V may be sub-divided into two sub-phases. Phase IV may begin before the close of the final neolithic period, but certainly extends well into the span of the Eutresis culture of southern Greece, and hence into the Aegean Early Bronze I period.

The pottery of Sitagroi phase IV is dark burnished, and without painted decoration. There are apparently no figurines now, in marked contrast to the preceding phase. Shaft-hole axes of stone are not yet seen. Copper objects are still found, including a fish hook, but the forms are all rather simple. There is little in this assemblage to link it with the Troy I culture, but as already remarked, the shallow bowls with high handles constitute a parallel with Early Thessalian I and with the Eutresis culture.

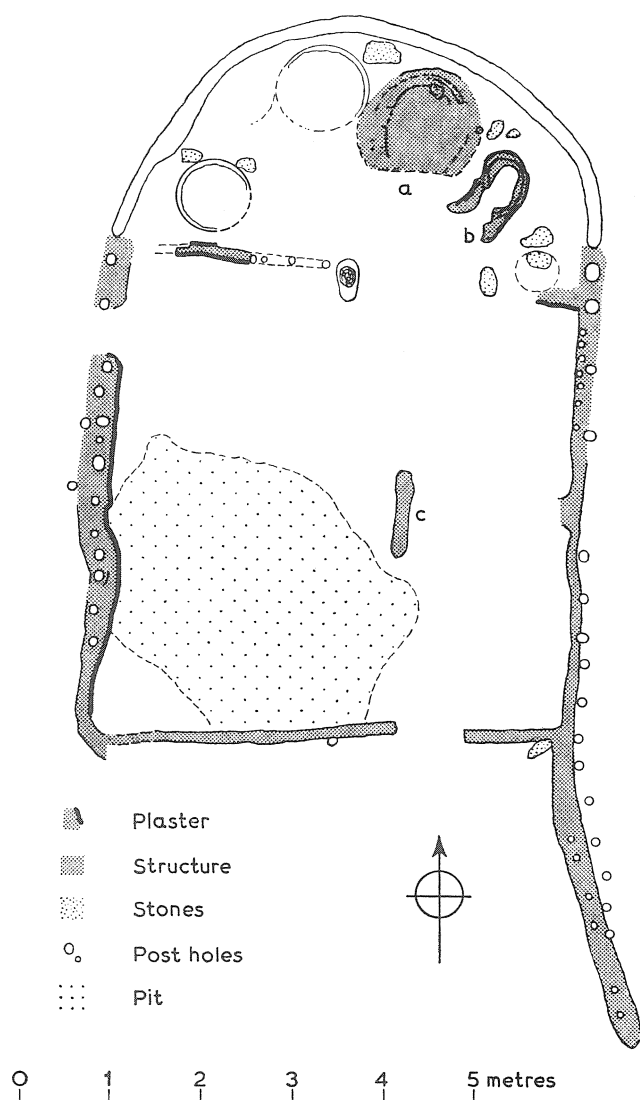


FIG. 7.8 The Burnt House of phase Va at Sitagroi, East Macedonia. (a) and (b) indicate ovens, (c) is the main hearth (drawn by R. J. C. Wakeham).

The Burnt House at Sitagroi (fig. 7.8; Renfrew 1970a) is assigned to phase Va. Its well-preserved foundations give a clear picture of timber frame construction, with the walls chiefly of pisé mud. The northern end was semi-circular, so that the house is apsidal in plan, like House Q at Rachmani, which is apparently earlier in date. At this northern end was a utility room, divided by a partition from the rest of the house and containing storage bins, a bread oven, a second oven, and several querns and grindstones.

The house contained a series of pots, some of them decorated with incised decoration, resembling the *Furchenstich* decoration of central Europe. There are few resem-

blances with the Troy I culture, yet Sitagroi Va must be set contemporary in part with Troy I. Cord-impressed ware is first seen at Sitagroi in phase Va.

The uppermost levels at Sitagroi, phase Vb, contained the remains of a long house, some 18 m in length. The construction was again of pisé set on a timber frame. Numerous storage bins were found. The pottery now includes many bowls with horizontal tubular lug handles as well as one-handled cups, which are the *Leitform* of the culture. Jugs are scarcely found, however. The terracotta objects include clay anchors and hooks, like those of the Troy I culture and the Bulgarian early bronze age (Renfrew 1969b, 26). For the first time shaft-hole tools of stone are found, including a fine axe with the end in the form of a feline head. Some of the metal objects are now of bronze.

The finds show several resemblances with those of early bronze age Troy. A two-handled cup suggests that Sitagroi Vb extends beyond the span of the Troy I period, and the radiocarbon dates support this view, indicating that Sitagroi V may cover much of the early bronze age.

Unfortunately the occupation at Sitagroi does not extend beyond this point, so that whether or not the same culture persisted in this region, perhaps until the end of the early bronze age, is not clear. But certainly we see at Sitagroi few of the innovations in settlement plan, in organisation, and in craft technology, which are evident in southern Greece and in the Troad. In fact the early bronze age cultures of Macedonia, like those of Thessaly, show little clear advance on the preceding neolithic period. At Sitagroi the finds of phases IV and V are dull and unimpressive when set beside the variety seen in Stratum III. It seems that Thessaly and Macedonia hardly participated in those changes during the Aegean early bronze age which brought about the emergence of Aegean civilisation.

Chapter 8

The Third Millenium BC in the Eastern Aegean

The third millennium was, in the eastern Aegean also, a time of rapid and remarkable change. From the beginning of its occupation Troy was a fortified proto-urban settlement, as soon became Thermi in Lesbos, Poliochni in Lemnos and Emborio in Chios. Metallurgy advanced rapidly, and the most impressive metal finds of the Aegean prior to those of the Shaft Graves of Mycenae are the magnificent treasures of Troy IIg.

So far very little is known of the prehistory of south-west Anatolia, along the Carian coast. But there have been abundant finds from north-west Anatolia and the offshore islands. They are sufficiently numerous to yield a vivid picture. Why sites are so very much rarer at this time further south remains to be established.

Coastal Anatolia was, of course, in contact with other regions of western Anatolia, and significant points of similarity are found at Kusura (Lamb 1936b), at Beycesultan (Lloyd and Mellaart 1962), and at Karataş-Semayük (Mellink 1965; 1967). Since these sites fall right outside the Aegean basin they are not considered here: a detailed consideration of the west Anatolian early bronze age has been given by French (1968). None the less the Aegean can only be meaningfully considered and understood with a concomitant awareness of developments in the rest of Anatolia.

The most important known site in the eastern Aegean is Troy itself. Fortunately Troy is also by far the most fully investigated, first by the pioneering work of Schliemann and Dörpfeld, and then the meticulous and amply documented study by Blegen and his colleagues. Troy was divided by Schliemann into successive settlements or 'cities', and this system was given definitive form by Dörpfeld (1902) who established a sequence of nine cities, of which VIIa is now considered by many to be the Homeric Troy. Cities I to V are dated to the early bronze age, and indeed the north-west Anatolian early bronze age is now essentially defined by reference to the material from Troy.

Blegen and his colleagues decided to retain the Dörpfeld sequence (Blegen 1961; Blegen, Caskey, Rawson and Sperling 1950; Blegen, Caskey and Rawson 1951). Their full description of the contents of the successive strata allows correlation with other sites in

north-west Anatolia and on islands near the coast—principally Thermi in Lesbos and Poliochni in Lemnos.

In the first section here the basic pottery and other changes which define the successive phases are considered, allowing the contemporaneity of other north-west Anatolian sites to be established. Then in succeeding sections the picture is filled out by considering the other material of the culture in the Troad. Brief reference is made also to the finds at Emborio in Chios and the Heraion at Samos, which fall within the same culture area, as defined by French (1968). The 'Yortan culture' finds are from the inland region of Bahkesir, and thus not strictly within the Aegean area. But Iasos, the only excavated site of this period in Caria, although it falls outside the north-west Anatolian culture province, is of considerable importance. In a later chapter the interrelations with other areas of the Aegean and the absolute chronology are considered.

The culture sequence at Troy and related sites

At Troy itself the earliest settlement is of early bronze age date. Only at the nearby site of Kum Tepe can something be learnt of the origins of the early bronze age in this area. The long-awaited monograph on the excavations there has not yet been published, but thanks to the kindness of Mr Blegen and the Turkish authorities it has been possible to examine the pottery, as discussed in chapters 5 and 10.

The characteristic ware is dark and well burnished, with thin-walled open bowls (fig. 5.3, 2) and especially thicker-walled open bowls with rolled rims in the Kum Tepe peri-

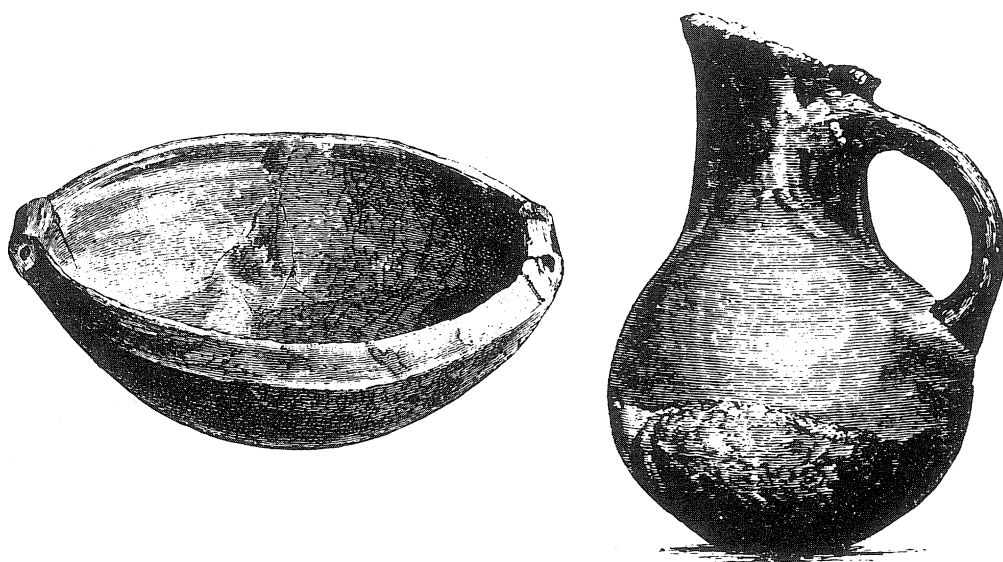


FIG. 8.1 Pottery of the Troy I culture (after Schliemann). Diam. of bowl c. 30 cm.

od (fig. 5.3, 5–9; Koşay and Sperling 1936, type d), being largely displaced by inturned-rim bowls (fig. 5.3, 11; *ibid.*, type b) in the Troy I period. At present little more can be said, and the distinction drawn between ‘Kum Tepe Ia’ and ‘Kum Tepe Ib’ has probably been exaggerated. ‘Kum Tepe Ia’ remains to be adequately defined, but French (1961, 102) has made an effective case for a pre-Troy I ceramic phase in the eastern Aegean, which is now generally designated Kum Tepe Ib. Its distinguishing feature is the dark-burnished open bowl with rolled rim (fig. 5.3), often with a horizontal tunnel lug set below the rim. This distribution of these bowls is further discussed in chapter 10 (cf. fig. 10.6).

In the Troy I period the pottery (fig. 8.1; Blegen 1961, 5; 1963, 52) remains dark monochrome, and the potter’s wheel is still unknown. Apart from the bowls there are spouted jugs, jugs with legs and various jar shapes. The first settlement has been divided into three sub-periods: in the first, bowls with thickened rims (Troy form A6) and angular bowls (Troy form A12) are common with footed bowls (Troy forms A7 and A13) and jugs with cut-away spouts (B16–19). In the late phase the pedestal bowls disappear, and a new curving-profile bowl becomes common (A16). Incised patterns are often seen, frequently on the inside rims of bowls. Just occasionally white painted decoration occurs. Copper awls, pins and a hook were found, and a clay mould for a midrib dagger (Blegen et al. 1950, 43).

The pottery of Troy II (fig. 8.2) constitutes a separate assemblage, which shows a development through the seven successive strata. In the later phases the black and grey polished wares give ground to pottery in lighter colours: brown, tan and red. The potter’s wheel was invented (or introduced) in phase IIb. By phase IIc numerous wheel-made flaring bowls (Troy form A2) are seen, and also heavy shallow dishes. At this time, the famous two-handled drinking cup, the *depas amphikypellon* (A45) makes its appearance, as also other one-handled (A39) and two-handled (A43) cups. Ovoid jugs and flasks are now seen (B7, B8), feeding bottles (B9) and globular or oval jars with a collar neck, sometimes with an applied human face on the side (C30) or on the lid (D13), which is surmounted by a knob. The curving-profile bowl (A16) remains common: sometimes there is now a horizontal loop handle at the rim (A11). Painted ware was not made locally, and decoration was limited to incisions, grooving or simple relief. The famous ‘Burnt City’, where Schliemann unearthed the splendid Trojan treasures, is now regarded as the last stratum of the Second City, Troy IIg. The very considerable range of metal types thus increases the range of diagnostic forms of the Troy II period.

The material of settlements III to V at Troy is generally grouped together, as representing the last phase there of the early bronze age. The third settlement of Troy is divided into four sub-phases. The pottery shows great continuity with the preceding period. The flaring bowl (A2) becomes thicker and deeper. The one-handled cups, *depas* cups, face pots and lids continue. The jugs with cylindrical neck and horizontal spout (B22) are now supplemented by beak-spouted jugs (B20) (fig. 8.3). A few terracotta animal figurines are also found.

The fourth settlement has five sub-phases. The pottery again shows little change. The use of straw tempering is now gradually adopted, and the potter's wheel very freely used. One innovation is the jar with wing-like handles and applied plastic decoration (C29). A shorter version of the *depas* cup is now seen (A44), and the askos (D29), and bowls decorated outside or inside with a painted red cross make their appearance. The fifth settlement, the last of the Trojan early bronze age, comprised four strata. The pottery is again little changed. The red cross bowls are now common.



FIG. 8.2 Pottery from early bronze age Troy (after Schliemann). Ht c. 25 cm.

With Troy VI, the middle bronze age, there is a marked change in the cultural assemblage at Troy. This is best illustrated by the pottery, where a whole new repertoire of forms is seen. Grey 'Minyan' ware, like that of Middle Helladic Greece, is very common: the characteristic shapes include footed goblets, two-handled bowls and sharply carinated bowls. Handles in the form of animal heads are particularly characteristic of the period.

These indications, lacking as they are in very clear-cut criteria for the phases, do provide material for correlations with other west Anatolian sites. Among these is the Protesilaos mound (Karağaçtepe), where the rather confused stratigraphy produced material dating from the final neolithic to the Troy II period (Demangel 1926).

The important town at Thermi in Lesbos yielded five strata clearly of early bronze age date, above which were middle bronze age remains. Thermi I to V belong to the earlier part of the early bronze age (Lamb 1936a, 209). The pottery shapes in general resemble

those of Troy I, and the *depas* cup is not seen, nor was the potter's wheel known. The winged jar (Lamb 1936, 52; pl. XXXVI, 443) is consequently not to be confused with those of Troy IV. Cut-away jugs are seen, but not beak-spouted jugs.

Lamb believed that the brown wares which become dominant in Thermi Town IV were contemporary with those of the early Troy II period, and that Town V was abandoned before the end of the Troy II period. Blegen and his colleagues, however, regard-



FIG. 8.3 Jug from Troy IV (after Schliemann).
Ht 30 cm.

ed Thermi I-V as running contemporary to Troy I (Blegen et al. 1950, 40), and most later writers follow this view.

The site of Poliochni in Lemnos also spans the early bronze age. The sequence there has been divided into seven phases (Brea 1955, 145; 1964, 29). Period VII has Mycenaean material and is certainly much later than the early bronze age. The chronological equation with Troy is shown in table 8.1.

The correlation between Poliochni V (Yellow) and developed Troy II is immediate: the finds include abundant brown wares with *depas* cups (Brea 1955, pl. xv), flaring bowls, and knobbed lids. Brea suggests that Poliochni V may persist into the Troy III-IV period, and certainly the winged jar (Troy form C29) is seen.

Poliochni IV (Red) lacks the developed Troy II forms. But Brea (1955, 145) rightly suggested that it may persist into the Troy II period. Elegant cups (Troy form A39) are seen, the tripod bowls are common, and so are stone battle-axes. Poliochni II (Blue) and III (Green) can then be attributed to the early and middle phases of Troy I. Jugs are common, as are incurving bowls, tripod pots and especially a long series of footed bowls, for which there is no exact parallel at Troy. A little white-painted ware is seen, as at Troy. There are, however, features in the Blue phase already suggestive of Troy II, and indeed the correspondence between the two sites is not complete. The preceding Black phase, phase I, probably antedates Troy I, although jugs are already seen (Brea 1964, pl. i, f) and the bowl shapes do not compare well with those of Kum Tepe Ib.

TABLE 8.1 Comparison of the stratigraphic succession at Poliochni (where levels have colour designations as well as number) with the sequence of 'cities' at Troy.

<i>Poliochni</i>		<i>Troy</i>
VI	Brown	V
	hiatus	
V	Yellow	II, III-IV
IV	Red	Late I, Early II
III	Green	Mature I
II	Blue	Early I
I	Black	—

This then is the reported pottery sequence of Poliochni. The published plans (*ibid.*, plans 22-26), however, present certain difficulties. Different quarters in the same town are ascribed in their entirety to different phases, and the picture given indicates a curious shifting of location within the perimeter. Limited confidence therefore can be felt in dates assigned to objects simply on the basis of location. Closed finds, with good associations, constitute the only valid material.

The finds at Emborio in Chios (Hood 1965a) place it in the same cultural region as Troy and these other sites. The earlier phases were discussed in chapter 5. Strata V, IV and III have finds of the Troy I culture, although there are local variations, and the culture may persist in Chios after the time of its replacement at Troy by the Troy II culture. Emborio II is assignable to the culture of late Troy I or early II, and Emborio I to Troy II (Hood *in lit.* 27 May 1969). But the finds of the Troy II culture at Emborio do not in fact seem identical to those at Troy: several elements of the Troy I culture persist.

The finds at Tigani on Samos are chiefly earlier than the early bronze age period, and have been mentioned in chapter 5. Those from the Heraion, on the other hand, are of early bronze age date, and place the site within the same culture region as Troy, although at its southernmost extension. The finds are not rich, but in giving an impression of the

later material of the early bronze age well to the south of Troy have considerable significance. Milošević (1961, 58) divides the finds into several groups, of which Heraion I to V are of early bronze age date. Heraion III has *depas* cups, and other forms suggesting a developed Troy II date. Phases I and II may likewise be assigned to Troy II. Heraion IV contains forms linking it with Troy IV (or V) beaked jugs, and short two-handled cups (Milošević 1961, pl. 16, 1–2; pl. 19, 7, etc.; pl. 15, 4 and 8; pl. 21, 5 and pl. 39, 22)—and there are several duck vases like those of the Cyclades (*ibid.*, pl. 15, 2; pl. 18, 1–2; pl. 19, 8). Heraion V has bowls with outturned rims which can be compared with Troy V bowls of form A21 (*ibid.*, pl. 39, 15 and pl. 44, 13; Blegen et al. 1950, fig. 251). Although there are forms at the Heraion not seen at Troy, the general similarity in the finds is striking.

The Troy I culture (north-west Anatolian Early Bronze I)

The picture we have of the Troy I culture can now be filled out somewhat with the aid of this chronological framework. We are fortunate in having the evidence of three major sites: Poliochni II–III, Thermi, and Troy itself. The finds from Emborio, when they are published, will extend this picture further.

The distribution of the culture has been given by French (1968, fig. 29, b.1), who lists 45 settlements on the coastal areas and off-shore islands of the west Anatolian coast between the Troad and Smyrna.

At Poliochni there are three strata immediately underlying those of the Troy I period, containing a village of oval huts (Brea 1964, figs. 25–28; 51–54). They yielded little except the heavy black burnished pottery already described. A few modest tools of bone and stone were found, but nothing in metal (*ibid.*, 547, superseding Brea 1955, 145). The earlier finds at Emborio have already been mentioned.

In Poliochni II (Blue) the settlement becomes larger. There is a defensive wall, and buildings now extend over some 200 m, the length of the settlement in later times. The plans for the successive periods at this site must, however, be used with caution. Thermi was likewise enclosed by a defensive wall, but not in towns I and II, which give the impression of a 'peaceful agricultural community without fear of aggression'. The site was probably fortified in phase III, and certainly in phase IV it had a solid defensive wall. The excavated area was about 100 m in length, and the long narrow houses are clustered closely together. The plans of the successive settlements, which were meticulously unravelled during Miss Lamb's excavations, and especially those of Thermi IV and V give a clear impression of proto-urban settlement (fig. 8.4).

Troy I was also fortified, and the enclosing walls—only 100 m in diameter—give it the impression of a citadel. The houses were apparently separate and free-standing: those at Thermi and Poliochni were more crowded. But the remains for this early period of Troy (Mellaart 1959a, 132) suffered badly during the first excavations at the site.

These four settlements, although small in size, differ markedly from the neolithic villages of the Aegean. With their stone-built fortifications and their controlled use



FIG. 8.4 Plan of the early bronze age town at Thermi in Lesbos (Thermi V) (after Lamb).

of space within them, they may be regarded as 'proto-urban' in character. Thermi and Poliochni were indeed small towns: Troy a fortress.

The wide range of decorated spindle whorls from Troy documents weaving. Numerous terracotta figurines were found at Thermi, although not at Troy or Poliochni. Indeed the local variation between the different sites of the Troy I culture is considerable. But apart from the architectural remains, it is the growing interest in metallurgy which distinguishes this culture from its predecessors. Metal now makes its appearance: pins, awls, a dagger from Poliochni, daggers, a spear and a knife from Thermi. A mould for a midrib dagger was found at Troy, and for a shaft-hole axe at Poliochni. An actual shaft-hole axe and a series of daggers and axes, forming an important hoard, were found in levels of Poliochni IV (Red), at the end of this period or the beginning of the next. Stamp seals are also found. No adult burials have been found, but infant burials occur in jars inside and outside houses.

Because it was effectively a one-period site, although with several sub-phases of occupation, Thermi gives the most striking picture of life at this time. The meticulous final report, a model of its kind, documents as fully as the archaeological remains will allow, the life in a proto-urban community of the eastern Aegean at the beginning of the third millennium BC.

The Troy II culture (north-west Anatolian Early Bronze 2)

The culture of Troy II, of the north-west Anatolian Early Bronze 2 period, marks the zenith of cultural development in third millennium Aegean Anatolia. The fortress at Troy II, the town at Poliochni V (Yellow) and, above all, the rich treasures which they contained, give an impressive picture of wealth and prosperity.

The Troy II culture shows some continuity with its predecessor, although the settlement at Thermi was abandoned, and the Troy I settlement itself destroyed. The distribution of sites has again been given by French (1968, fig. 31). As against 45 settlements for the Troy I culture, he now lists only 10. Only one of these, at the Heraion in Samos, is apparently a new foundation. The others continue from the previous period. Many sites, like Thermi, appear to have been abandoned, for reasons which are not clear.

The citadel of Troy itself was rebuilt. Nearly all the settlement of the period at Troy was excavated (Mellaart 1959a, 136), revealing long houses, one more than 30 m in length, known as the 'megaron' or 'the great hall'. The citadel is still only 110 m in diameter (fig. 18.13, 2). Several building blocks have been excavated at Poliochni (fig. 6.4), which was larger than Troy, and gives (as in the preceding period) the impression of a town rather than of a citadel. The urban character of the site is brought out by comparing the house blocks of Poliochni (Brea 1955, 147, fig. 1; 1964, pl. 25) with the traditional timber frame houses seen at the same time at Sitagroi in eastern Macedonia (fig. 7.8).

The most striking advance now is in the metal work. At Troy, gold beads and a silver bowl were found during the American excavations, and these permit, with fair reli-

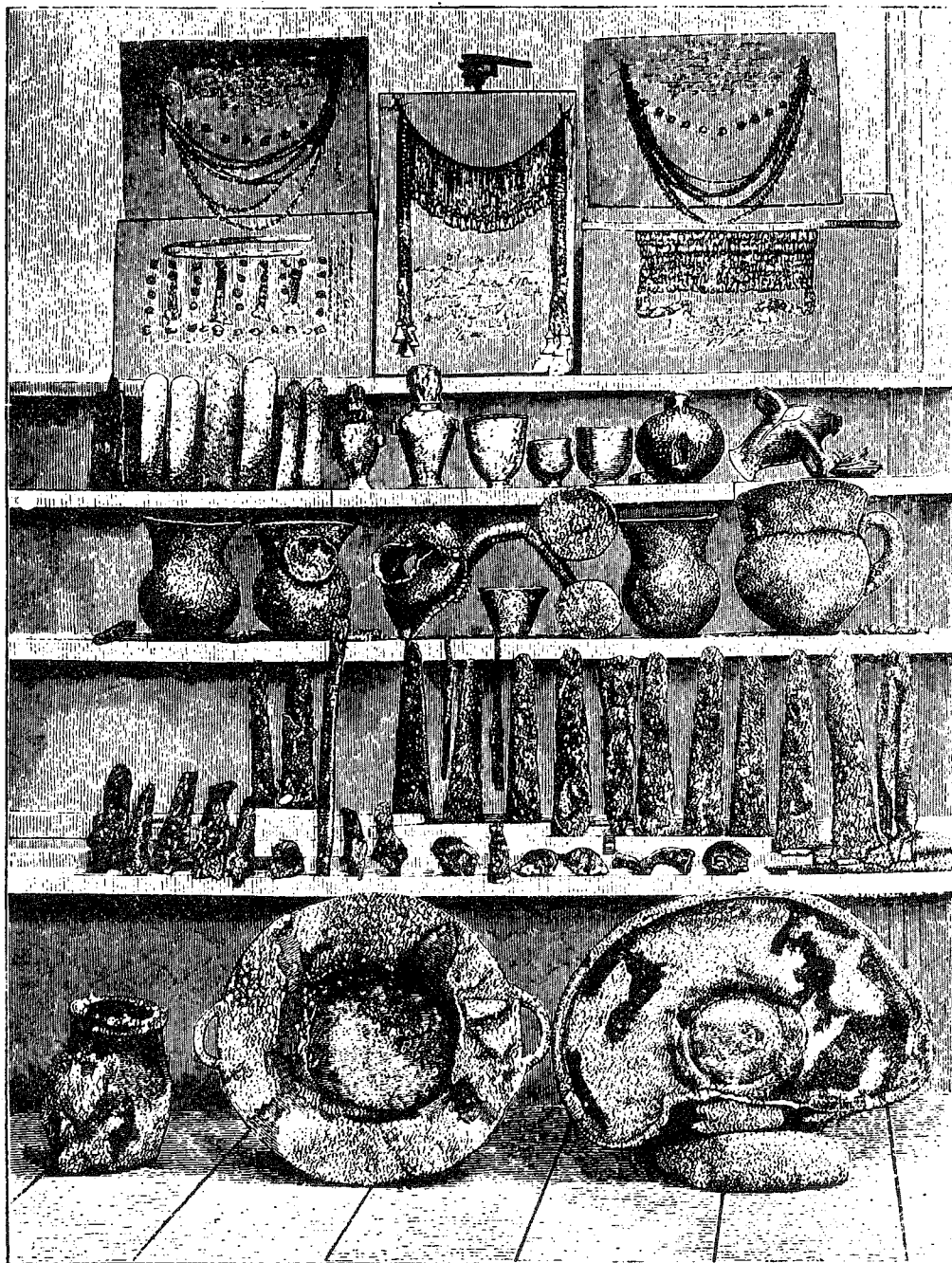


FIG. 8.5 The 'Great Treasure' (Treasure A) from the Second City at Troy
(after Schliemann).

ability, the attribution of the great series of treasures found by Schliemann to the destruction levels of Troy IIg. These are all conveniently listed in Hubert Schmidt's catalogue (1902) of the Schliemann collection, formerly in Berlin and now mysteriously 'lost'. Treasure A, the Great Treasure (fig. 8.5), contained many vessels of gold, electrum, silver and bronze, as well as jewellery, bronze weapons and silver bars (fig. 19.1), and Treasure K included several stone battle-axes of fine workmanship (fig. 18.4), which were obviously weapons of display. The richness of this treasure transforms our view of western Anatolia at this time.

The splendid golden jewellery found in the levels of Poliochni V (Yellow) (pl. 18.5; Brea 1957) completes this picture. Both these finds were treasures of the living, but they invite comparison with the splendid goods of the dead in the rich burials of the approximately contemporary sites of Alaca Hüyük (Mellink 1956) and Horoztepe in central Anatolia.

Blegen (1963, 80) has emphasised the continuity in the development of the pottery in the early phases of Troy II. It is in Troy IIc that the first evidence is seen for the use of the fast wheel, and new ceramic forms develop, including the typical two-handled cup, the so-called *depas*. This is a form widely seen elsewhere in Anatolia. Figurines are still found. No cemeteries of this period are known, but a few individual burials of adults occur at Troy.

The final settlement of this culture at Troy II, Troy IIg, was destroyed in a conflagration which concealed the treasures to be discovered by Schliemann. This does not, however, allow us to generalise by suggesting a more widespread 'wave' of destruction.

Troy Periods III–V (north-west Anatolian Early Bronze 3)

The eastern Aegean towards the end of the third millennium did not, apparently, sustain the dynamic change which marked the earlier years. At Troy the culture continued without serious interruption. French (1968, fig. 48, b.1) in his useful survey, now lists 17 settlements of the culture, of which Troy is again the most important and the most fully investigated.

The Third, Fourth and Fifth Cities of Troy were, like their predecessors, well fortified. Considered as a whole, the pottery of Troy III is practically indistinguishable from that of Troy II (Blegen 1963, 96), and the overwhelming impression throughout the period is one of continuity. Blegen reports some changes in subsistence, bones of the deer *Cervus dama* now being the most frequent. Domed ovens make their appearance in phase IV.

In general, however, despite certain ceramic innovations, the north-west Anatolian Early Bronze 3 period seems to have been a time of consolidation rather than of change.

The culture of the Troad in the middle bronze age

The new culture at this time marked an expansion in the size of Troy. The citadel of Troy VI, with its impressive fortification walls, was more than 200 m long. Building was of well-dressed stone. Houses and buildings were constructed on a new plan, without regard to the constructions of the preceding period.

The material culture, although exhibiting different forms from the previous early bronze age culture, is not markedly different in kind. An important new feature, however, is the presence of a cemetery of cinerary urns outside the citadel, containing the cremated bones of adults and the unburned bones of children.

The pottery displays a whole new repertoire of shapes, amongst which are those of grey Minyan ware very similar to their contemporaries in mainland Greece.

Although the splendid fortifications of the enlarged citadel at Troy VI testify to a well organised community, the overall similarity in conception to the settlement in previous phases is marked. We do not observe here any indications of civilisation such as are seen in contemporary Crete, or emerge some centuries later in Mycenae. This seems perhaps odd in view of the precocity of Troy II. Yet Troy VI—or for that matter Troy VII in the late bronze age—does not differ very strikingly in kind from its early bronze age predecessors.

The Yortan culture and its contemporaries

No cemetery whatever has been found for early bronze age Troy, or indeed for Thermi or Poliochni. Inland to the south-east, however, are several sites, including Yortan and Ovabaymdir, where important cemeteries have been found.

The corresponding settlements are as yet little known, and most of the finds result from illicit excavations, so that associations are not adequately recorded. There were two types of graves: pithos burials were most common, the dead person being inhumed in a contracted position inside a large jar, the mouth of which was closed with a stone. Cist graves, consisting of upright stone slabs, are rarer. The grave goods (Schiek and Fischer 1965) are chiefly of the Troy I and Troy II periods, and may indeed begin before the time of Troy I, although French (1968, 22) has argued that they should in general be set at the time of Troy II. Footed jugs, tripod jars and pyxides with lids, often with heavy incisions, are common. The range of metal forms (chiefly daggers) is wide, and burial seems to have continued at least into the Troy III period (Schiek and Fischer 1965, 172).

Further south and well inland, lies Kusura, near Afyon. Kusura A is a cemetery of similar nature, again with both kinds of graves, and dating from the early Troy I period (Lamb 1936b). Kusura B may be equated with late Troy I or Troy II. Still further to the south in Lycia, and like Kusura remote from the Aegean region which is our concern here, is Karataş-Semayük. An extensive pithos cemetery and settlement have been ex-

cavated. The site is particularly relevant here for the series of radiocarbon dates cited in chapter 13 from a burnt level of the settlement. The finds in this level are equated by Machteld Mellink (1965; 1967) with those of late Troy I and of the Red phase (IV) at Poliochni, and Kusura period B. The ceramic finds seem to bear this out, and the cemetery and settlement continued in use through the developed Troy II period into Troy IV.

Although not directly relevant to the Aegean, the Karataş and Kusura finds supplement the information obtained from the Yortan cemeteries, as well as giving the only reliable radiocarbon dates from Anatolia which can be related to the Trojan early bronze age.

The well-stratified finds at Beycesultan have also been used in this way, and Mellaart has given a valuable synoptic table of Anatolian chronological relations, together with good distribution maps for the Early Bronze 1, 2 and 3 periods (Lloyd and Mellaart 1962, 112, 138, 196, 252, 256 and 257; Mellaart 1962, 12, 25, and 44), although he has recently modified the terminology there employed (Mellaart 1970). But it must be stressed that the precise chronological relations between these various areas and the Aegean are unclear and disputed.

Iasos and the early bronze age of south-western Anatolia

More directly relevant to the Aegean are the finds from Iasos on the coast of Caria, in south-western Anatolia. Here Doro Levi (1963a; 1967) has excavated an important cemetery of cist graves, mostly rectangular but some of oval or circular shape.

They were constructed of upright slabs, generally four in number, but in one case a dozen slabs were used. The graves were oriented roughly east-west (fig. 19.10, 1). The 83 cists excavated each contained one, two or several inhumations. Children were also buried in this way. Some graves were entirely without goods. Others had one or more pots. The graves contained marble vessels, and a few fragments of obsidian and of copper were found. The most impressive find was a simple dagger of Anatolian type with two rivet holes.

As the only early bronze age cemetery of Aegean Anatolia, as well as the only prehistoric site yet systematically excavated in Caria, Iasos is of great interest, and its resemblances with the Cyclades are discussed below in chapter 10 and Appendix 2.

In order to deal with the Cycladic resemblances of the cemetery it is necessary to date it in Anatolian terms. The two white-painted vessels (Levi 1967, fig. 163) and the appearance of some of the burnished pottery suggest the cemetery may have begun as early as the Troy I period. The narrow *depas*-like handles of one flask (ibid., fig. 167, 6) indicate that it continued in use well into the Troy II period. This impression is confirmed by an incised footed vessel (Levi, 1963, fig. 97, 9) which finds a close parallel in the Yellow period (V) at Poliochni (fig. 7.3). (Myrina Museum, Lemnos, no. 926). The characteristic finds of the Early Bronze 3 period of north-western Anatolia are not seen.

Several other prehistoric sites in Caria are now known (Vermeule 1964b), notably Muskebi on the Halikarnassus peninsula, some way south of Iasos. The finds are few, however, and add little to our knowledge of the eastern Aegean in the third millennium.

This brief summary has done no more than mention some of the more important excavated sites of the eastern Aegean early bronze age. It has not taken into account the many sites, known chiefly from surface remains, listed by French (1968). These sites are evidently closely related to others further inland such as Beycesultan, and to central Anatolian sites like Alaca Hüyük, and indeed to those of the southern coast like Tarsus or Mersin. Our concern here is with the Aegean, however, and the development of its civilisation. To deal also with these would lead too far afield.

The framework indicated is sufficient to allow the construction of a relative chronology for the Aegean.

Chapter 9

The Early Cycladic Culture Sequence

The foregoing chapters have shown how the culture sequence in the third millennium BC may independently be established for Crete, for southern Greece and for north-western Anatolia. The Cycladic sequence has not been subjected to any detailed examination in recent years. Eighty per cent of the available Early Cycladic material was excavated before 1910, and no comprehensive attempt at a synthesis has been made since Åberg's work in 1933. The material is particularly abundant, and derives chiefly from graves. The lack of finds from settlements means that there are few stratigraphical sequences of any kind, and several writers have thus felt free to impose their own Early Cycladic I, II, III arrangement on the material, purely by analogy with the Cretan or mainland systems.

With the wealth of rather exotic finds, and the considerable flexibility in their assumed chronological position, the region has become a sort of lucky-dip for hunters after cultural parallels, and there is scarcely an early bronze age site on the coasts of the Aegean or indeed of the Mediterranean where Cycladic influence has not been suggested often on the flimsiest of evidence. It is frequently felt to be sufficient for the suggestion of cultural connections that two objects found at distant places should show some similarity of form, without a detailed consideration of their respective contexts, or even of the chronology.

The aim here is to define precisely and describe in some detail the principal groups of material in order to provide a framework from which such comparisons can be made. As indicated in chapter 4, a nomenclature whereby the material is divided into 'cultures' on the basis of recurrent associations is preferred to the use of terms such as 'Early Cycladic I' and so on.

The concept of type is used here without further analysis: one of the most striking features of the Early Cycladic finds is the way they do in fact fall into types. Of the many hundred pots known from graves of what has been termed the Pelos group, there are really only four shapes. And time and time again when a supposedly unique form is published, other examples turn up to show that it may be regarded as a type. Thus the seated 'harpist' from Keros is closely paralleled by two from Thera (pl. 27, 2), and by

three fragments from Naxos (Papathanasopoulos 1962, pl. 79). A curious eared figurine with prominent kneecaps (pl. 2, 2 and 3; Tsountas 1898, pl. 10, 4) can now be called the 'Plastiras type' after several finds by Doumas at the site of that name in Paros. Again the striking green handle of stone published by Blinkenberg (1896, 48) finds parallels at several sites in Naxos, notably near Aghioi Anargyroi. So that, while a detailed analysis of the artefacts into trait clusters might be intellectually more satisfying, there can be little doubt that the result would be much the same as the direct and intuitive division into types which is adopted here.

The only well-stratified settlement site of the third millennium in the Cyclades is Phylakopi, excavated under the day-to-day direction of Duncan Mackenzie (Atkinson et al. 1904; Mackenzie 1963). The important settlement of Aghia Irini in Kea does also have deposits of this period beneath the more ample finds of the later bronze age, but present indications are that the finds relate more closely to those of the mainland than of the Cycladic islands (Caskey 1964b). And the settlement of Paroikia in Paros is predominantly of the later bronze age also (Rubensohn 1917). Most of the important excavated settlements in the Cyclades are single period or unstratified sites, such as Chalandriani in Syros (Tsountas 1899; Bossert 1967), Dhaskalio in Keros (Doumas 1964) and those in south-east Naxos (Doumas 1963; 1964).

The available material comes principally from the cemeteries, chiefly from the early excavations reported by Bent, Dümmler, Tsountas, Edgar, Stephanos and Varoucha. In recent years there have been further important cemetery excavations, notably by Doumas.

Perhaps for this reason there is considerable confusion in the literature concerning the sequence and date of the Early Cycladic material. Most writers since the time of Kahrstedt, including Childe and Åberg, have distinguished a Syros group and a Pelos group—terms usually not well defined. It is not always clear whether or not these are considered to be contemporary. Moreover, while Weinberg (1954, 96) on the one hand has seen in the stamped spirals of the Syros group a synchronism with the Dhimini culture of Thessaly, Åberg (1933, 74) correlates such decoration with the Shaft Graves of Mycenae, at least a millennium later.

Åberg indeed placed many of the Cycladic graves in a middle bronze age context, appealing to a supposed lack of other material in that period, a lacuna now amply filled by the work of Scholes (1956). His arguments misled even Childe, and in them unfortunate prominence is given to two finds. One of these is a grave at Aghios Loukas in Syros containing a Minyan ware bowl, a jug and an incised pyxis (Tsountas 1899, pl. 6, 24 and 27). There is no reason to class it in the Syros group—the pyxis, which is conical, resembles rather those of Phylakopi I, of which it may indeed be a late version—and the find is entirely without chronological significance for the Early Cycladic graves. He lays weight also on the middle bronze age affinities of the Amorgos finds, which for some reason are placed in his Pelos group. The finds do indeed have Middle Minoan relations, but this need not cause any difficulty, for the Amorgos group, as will be seen below, can be set at the end of the Early Cycladic period. Åberg's difficulty was increased by his doubts

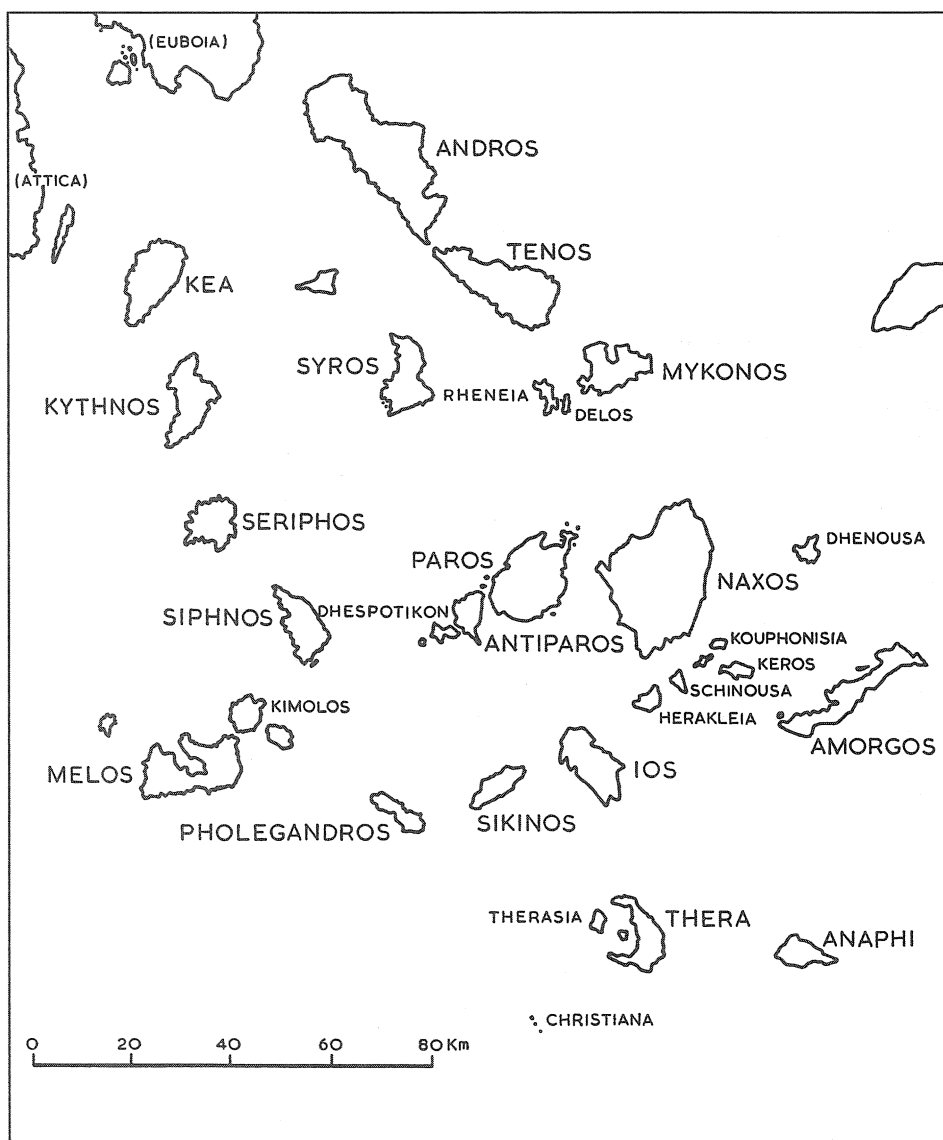


FIG. 9.1 The Cycladic islands.

on the Phylakopi stratigraphy (1933, 110 f), which left him without any framework for the material. It is only with his acceptance of the appearance of Cretan Kamarese ware in the Second City of Phylakopi that one finally feels on firm ground.

Without undertaking further excavations at early bronze age sites in the Cyclades—and this the writer has not yet been able to do—the research worker has three major sources

of information bearing on the chronology of the period in question. The first of these is such stratigraphic evidence as may be available, which comes chiefly from a single site.

The known sites, and especially the cemeteries, in the Cyclades are now very numerous. Their location, and the surface observations made at them can provide a second potential source of information. And thirdly the association of the finds within individual graves in the cemeteries has in many cases been recorded. The results yielded by these three approaches will now be presented.

The Phylakopi stratigraphy

Phylakopi is the only well stratified site in the Cyclades, and its excavation by the British School in 1896 to 1899 has rightly been hailed by Blegen as 'the first really serious effort to understand stratification, the first really good excavation in Greece'. The publication (Atkinson et al. 1904) was in many ways ahead of its time, but it was a joint work by several writers, and minor inconsistencies do occur, although Åberg has perhaps made rather much of them (1933, 25). There is really no disagreement in the work about the basic sequence of three cities, preceded by an earlier phase. Both Edgar and Mackenzie agree that the pottery styles may be correlated broadly with these building phases, and there is harmony too on points of detail—such as the persistence of the 'geometric' painted ware, frequent in the First City, into the early phases of the Second City. But on matters of interpretation, such as the question of 'catastrophes', there is certainly disagreement.

Åberg was in a sense right to ask for corroboration of these statements—which are often no more than undocumented assertions—and in the absence of adequate evidence to take a sceptical position. But the situation has been transformed by a study of the admirable and scrupulously factual Daybooks kept by Mackenzie (1963) throughout the excavation of the site. The late Mr R. W. Hutchinson kindly drew attention to their existence in the possession of the British School at Athens. With the permission of the School a typewritten transcript has been made of the Daybooks, and this provides the basic documentation of findspots which is necessary to substantiate the published conclusions. It certainly supports most of these, although Mackenzie's finer subdivisions are perhaps a shade elaborate (Atkinson et al. 1904, 248 f). Blegen has suggested that he was influenced by the Cretan classification which was being worked out, with his own collaboration, at the time he was writing his Phylakopi chapter.

Of course many terms have changed in meaning: 'Early Mycenaean' was often applied to middle bronze age material, and 'Minyan ware' was not so termed at Phylakopi until the excavations of Dawkins and Droop (1911). The essential picture, however, is clear, and the very sound steps in stratigraphical reasoning—then at an early stage—are of considerable interest in themselves.

It is perhaps useful too, in assessing statements made—not all of which are acceptable today—to distinguish between the recording of opinions and actual observations.

The latter give a picture wholly consistent with the basic threefold division, while the former must sometimes be altered in the light of new evidence. The whole sequence is so obviously validated in the Daybooks that it is not proposed to give here a detailed analysis of them.

Reference has been made elsewhere (Renfrew 1965, 61) to passages in the Daybooks where a sound threefold stratigraphy is recorded. It is clear that First City material was frequently found in good association. The diagnostic importance of incised wares, notably the conical pyxis and the duck vase (pl. 12), is underlined. Together with these were found the 'geometric' painted ware including the beaked jug (pl. 10, 2), the Melian bowl, the one-handled mug and the kernos (pl. 11, 1). It is clear too that the First City was occupied prior to the construction of the town wall, and that it was followed by the fortified Second City (pl. 21, 3) in which closed deposits were also found. These included imported Kamares ware. For these and other statements the Daybooks give detailed corroboration which supplements the presentation in the final excavation report.

Absolutely crucial to the Early Cycladic chronology is the careful account given in the Daybooks of the stratigraphical dig in squares JK 1-2 (Mackenzie 1963, DB 1898, 12). There the finds of pre-City material are described in some detail, notably the simple burnished ware, often with tubular lug handles (pl. 4, 8), and pithoi with raised bands bearing incised decoration. These shapes, identifiable today among the preserved finds, provide the best documented occurrence of the domestic material of what we shall call the Grotta-Pelos culture.

The terms 'Phylakopi I' and 'Phylakopi II cultures' are proposed for the finds of the First and Second Cities respectively. They are defined and discussed in chapter 12 and in the next section. The term Phylakopi O, or pre-City, will be used for the 'primitive material' from the lowest levels of Squares JK 1-2. It has been possible to study all the material from Phylakopi that is preserved in Melos, Athens and Oxford, and a clearer picture of the pottery of these cultures can thus be painted than is possible from the original publication.

The Phylakopi stratigraphy gives us two clear groups of material of relevance to the early bronze age, and this fact must be the starting point for a relative chronology. But it does not follow that these two cultures cover the entire period, for the remains there prior to the First City are very scanty and not really very fully recorded. It will be argued in chapter 13 that Phylakopi I is partly contemporary with the middle bronze age of the mainland—a typical duck vase, for example, was found in Middle Helladic Eutresis (Goldman 1931, 184)—and with the Early Bronze Age 3 phase of Anatolia. Equally the Phylakopi O wares are closely paralleled in the Kum Tepe Ib material of the Troad. This precedes Troy I and is thus contemporary with the mainland final neolithic. Between the two may be something of a gap. It may well be of significance that fragments of a painted mug, apparently of Syros type (cf. pl. 7, 4), were found in the twelfth half-metre of Square JI (Atkinson et al. 1904, 86). This is a level above most of the Phylakopi O material and lower than that of Phylakopi I, so that the find does support the position of the Syros group chronologically between Phylakopi O and Phylakopi I. Moreover several vessels

described in Edgar's pottery class 2 (*ibid.*, 85–87) resemble Syros forms. Some of the plain burnished wares from the West Cemetery also (pl. 8, 12–13), which do not conform either with the First City or pre-City material, may fall into this intervening period.

In addition several folded-arm figurines were found at Phylakopi (pl. 8, 1–3), and it is argued below that this type is of Keros-Syros date. It should be observed that the schematic Phylakopi I figurines (pl. 8, 6–8) are not to be connected with the schematic form of the Paros and Antiparos cemeteries. They seem rather, like the schematic shouldered ones of Kea, to be of Phylakopi I or even middle bronze age date.

It is possible therefore to make a number of statements and suggestions on the basis of the Phylakopi stratigraphy, but a clear idea of the period can be obtained only by taking the cemeteries into account.

The Phylakopi II culture

For the present purpose this middle bronze age culture is of interest in so far as it provides a chronological fixed point, before which the Phylakopi I culture and the entire early bronze age must be set.

It is characterised by matt-painted ware (pl. 13, 3), with black curvilinear decoration on a chalky white or yellow ground which contrasts in fabric and in style with the Phylakopi I painted wares. This ware is found at Phylakopi exclusively in the Second City. At this time the fortifications were first constructed (pl. 21, 3). Such wares have been found at Akrotiri in Thera (Åberg 1933, 133), at the Paros acropolis (Rubensohn 1917, fig. 68) and at Grotta in Naxos (pl. 13, 1). Outside the Cyclades they are documented both at middle bronze age Lerna (Phase V: Zervos 1957, pl. 284–86) and at Knossos (pl. 13, 2) where they occur in a clear Middle Minoan Ib context.

Minyan ware is seen at Phylakopi (pl. 13, 5–6), principally in the Second City (Dawkins and Droop 1911, 17) and it certainly does not occur earlier. Considerable quantities of Kamares ware have been found (pl. 13, 4) and Mr Sinclair Hood has kindly indicated that it includes both Middle Minoan IIa types and examples which he would include in his revised classification of Middle Minoan Ia (see chapter 13).

It is thus possible to set the beginning of the Second City, and the first fortification of Phylakopi, as contemporary with the Middle Minoan Ia period in Crete, and with the earlier middle bronze age of the mainland. This important result of the Phylakopi excavations has considerable value for the chronology of the Cycladic early bronze age, and is utilised in chapter 13.

Prehistoric sites in the Cyclades

Following this re-examination of the Phylakopi sequence it seemed useful to visit all known prehistoric sites in the Cyclades, and to search for new ones. The results of this

survey are briefly summarised in the Gazetteer (Appendix 1). Many of the locations are known solely through the discovery of cist graves: at others, traces of settlement have also been found. One by-product of this search was the identification as a neolithic site of Saliagos in Antiparos (Belmont and Renfrew 1964), and the consequent recognition, as a result of excavations there (Evans and Renfrew 1968), of a distinctive neolithic culture in the Cyclades, to which reference has been made in chapter 5. The sites in the Gazetteer are classed, where possible, into the cultures defined in this chapter: Grotta-Pelos, Keros-Syros and Phylakopi I. But for the moment it is sufficient to accept that neolithic and later bronze age sites can be identified rather readily. The cist grave cemeteries belong to the early bronze age.

One important consequence of the surface survey was the equation of material found at two important early settlements with part of the material from the cemeteries designated by Childe and Åberg as the Pelos group. This relationship with the settlement material is of great interest.

Pre-City Phylakopi and the Cycladic cemeteries

The simple burnished wares of Phylakopi O were already compared by Edgar (Atkinson et al. 1904, 82 f) and by Mackenzie (1963 [DB 1898, 22]) with the finds from the cemetery at Pelos in Melos. These last have given their name to an important series of finds from cemeteries in several of the islands. But it may be that the Phylakopi O and Pelos finds were rather hastily equated and, while the conclusion is supported here it seems wise to substantiate it in more detail.

Fortunately it has been possible to study some of the material from Phylakopi which, although unlabelled, may be recognised from Mackenzie's descriptions as coming from the Phylakopi O layers. Prominent are rounded bowls of thick burnished ware (fig. 10.1, 10-13; pl. 4, 7). Some of these have thickened rolled rims. The principal handle form is the horizontal lug, pierced or unpierced, but ledge handles also recur, as do 'cheese pots' (fig. 10.2, 1-6).

Exactly this assemblage of forms (fig. 10.1, 1-3) is preserved in the museum store-rooms of Naxos, deriving from Welter's excavations at Grotta, and there termed by him (Karo 1930, 134) 'sub-neolithic'. The material is described and illustrated in chapter 10 and Appendix 2 (fig. 10.2, 7-12).

We are faced therefore with two homogeneous groups of material: that from the Pelos-type graves of Melos, Paros, Antiparos, Naxos and Siphnos, and the 'sub-neolithic' finds from Grotta and Phylakopi O. None of the domestic wares has been found in the cist graves, with the exception of an oblong bowl with a horizontally pierced lug handle from a grave at the cemetery of Pelos in Melos. At first sight therefore it is not obvious why the two should be grouped together, for on a strict application of Childe's definition they would fall in separate cultures. But as will be seen, a number of arguments lead us to believe that the two assemblages were in use at the same time and by

the same group of people. It seems, however, that the incised decoration applied to pyxides and so forth was used chiefly for funerary vessels, so that examples are scarcely met with in the settlements.

Fortunately just a few of the grave forms have been found in the settlements at Grotta and Phylakopi. From Phylakopi comes an incised pyxis lid (pl. 4, 10; Zervos 1957, pl. 84) which differs in shape and decoration from those of the Phylakopi I culture (pl. 10, 5), as well as marble bowl fragments of a kind seen in the graves, and fragments in both clay (pl. 4, 9) and marble of the footed vessels familiar from the cemeteries (pl. 3, 5; cf. Mackenzie 1963 [DB 1898, 22]). Similar finds come from Grotta, where they include several 'frying pan' fragments of the type found entire in a grave at Kampos in Paros (Varoucha 1926, 107).

More convincing evidence perhaps than these finds is provided by the discovery of several more early settlements, adjacent to the Pelos group cemeteries, during a recent survey. These were identified by surface finds and provide examples of the Phylakopi O-Grotta domestic wares which are lacking in the graves themselves. The typical rolled rim (pl. 4, 2-6) has been found on settlements adjoining the Pelos cemeteries at Pelos itself, at Aghioi Anargyroi and Ana in Naxos and on the Epano Kouphonisi, ledge handles at Pelos, Aila and Kastraki in Naxos and Akrotiraki in Siphnos, and incised-cordon pithos fragments at Ana, Kastraki, Akrotiraki and Cheiromylos in Dhespotikon. The finds from some of these cemeteries are exclusively of Pelos type, and an equation between the domestic and funerary material seems inevitable. The term Grotta-Pelos culture is proposed for all this material together. It is further discussed in chapter 10, together with the evidence from outside the Cyclades which tends to support the association.

Analysis of the cemetery assemblages

A very few graves from the Early Cycladic cemeteries contain types of what we have defined as the Phylakopi I culture. In the first instance, of course, there are the tombs from Phylakopi itself (Atkinson et al. 1904, 234). And in addition a few of the cist graves on Amorgos contained duck vases (pl. 12, 6) and other shapes of the culture (Dümmler 1886, Beilage A).

In general, however, the material is very different from that of the Phylakopi I culture. It has been divided in the past, and with good reason, into two broad groups, sometimes designated 'Pelos' and 'Syros', after the excavated cemeteries of Pelos in Melos and Chalandriani in Syros. It is indeed clear, on inspection of the material, that the finds from these two cemeteries have few resemblances. In 1965 it was possible to show, without a formal quantitative treatment, that two distinct groups of material can indeed be defined which do not normally occur together in the same grave, although they may both be found in the same cemetery (Renfrew 1965, 67).

This informal assessment can now be set upon a more systematic basis. Ideally one would wish to compare systematically the finds in each grave with those from every

other. On the assumption that the graves whose contents are most closely similar will be most closely related (whether in time or in terms of cultural affinity) it should be possible to organise the material in such a way that the most closely similar graves are placed together. The graves should then be arranged in a meaningful order, significant chronologically (or in terms of whatever other variable is responsible for the variations observed). This is, of course, the procedure known as seriation, invented in the last century (Petrie 1899) and set upon a more systematic basis by Robinson and Brainerd in 1951 (cf. Kendall 1969).

Unfortunately some of the graves are so meanly furnished with goods that they show no similarities, although they could be exactly contemporary, and representatives of the same cultural group. For example:

Grave 1 might contain the types A B C D E F G H I J K L

Grave 2 might contain the types A B C D E F

Grave 3 might contain the types G H I J K L

Grave 4 might contain the types A B C G H I

Grave 1 may be a rich grave of a given date, and graves 2 to 4 poorer graves of the same culture and date. Yet graves 2 and 3 are totally different in terms of their contents. The poverty of grave goods in some of the burials is well seen in table 9.1.

It was therefore found necessary, instead of considering and comparing individual graves, to take the entire cemetery as the operational unit under consideration. For the present purpose all the finds from a given cemetery are thus considered to be associated together. It remains true that cemeteries used for the same short period of time may be expected to contain similar grave goods (if they belong to the same cultural group). And cemeteries of different periods will be different. But clearly cemeteries of long duration may show similarities both with the early cemeteries and the late ones.

The work here described was carried out in collaboration with Gene Sterud of the University of California at Los Angeles. A by-product of this research was the invention of a new and rapid method, close proximity analysis, for handling material in this way. An account of it has already been published (Renfrew and Sterud 1969). Mr Sterud has kindly agreed to my giving here a fuller account of our work on the Cycladic cemeteries.

The first step was to tabulate the grave goods found, on a cemetery-by-cemetery basis. Fortunately the writings of Tsountas, Papathanasopoulos, Edgar and Varoucha give sufficient detail of the associations to permit this. The resulting incidence matrix (i.e. table of finds by cemetery) is given in table Appx. 3.1.

After the compilation of such an incidence matrix, the next step is to compare each cemetery with every other cemetery, in terms of the finds made at each. This can be done in two different ways.

The simplest procedure is to produce a presence-absence similarity coefficient matrix. For example, cemeteries A and B will have a similarity coefficient of 5 if they have five types mutually in common, irrespective of the number of times these types occur

at each cemetery. The resulting matrix, constructed with the aid of edge-punched cards but without the use of computer facilities (Renfrew and Sterud 1969, 273, Table 3), is seen in table Appx. 3.2.

The new ordering procedure, close-proximity analysis, allows the cemeteries to be arranged rather quickly, and without the aid of a computer, into the diagrammatic form given below. Adjacent cemeteries in the diagram are closely similar to each other, and the arrangement is based solely on such similarities. The diagram can thus be used as a basis for the classification of cemeteries. It is at once clear that the cemeteries formerly described as of Syros type (Chalandriani, Spedos, Karvounolakkoi, Dokathismata and part of Akrotiraki) are distinguished neatly from those formerly designated as the Pelos group (fig. 9.1).

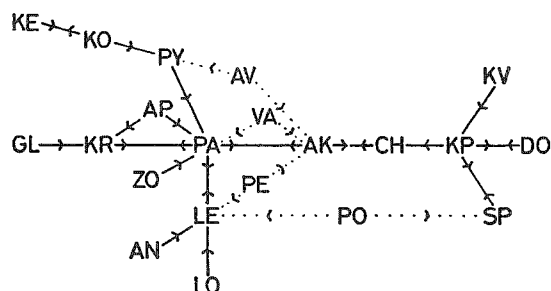


FIG. 9.2 Close-proximity structure for the Early Cycladic cemeteries, using presence-absence similarity coefficients (table Appx 3.2). Coefficients less than 2 have been discounted. (For abbreviations see Appendix 3).

An alternative procedure is to compile a similarity coefficient matrix of Robinson-Brainerd type (see table Appx. 3.3). Here the types present at a cemetery are first indicated by percentages in the incidence matrix. Thus a cemetery with three examples of type X and one of type Y will score 75 per cent for X and 25 per cent for Y. The similarity coefficient between this cemetery and another is calculated as Robinson described (Brainerd and Robinson 1951, 295). On this basis, the number of occurrences of a given type in a cemetery, and not simply of its presence there, is of significance. This is the basic difference between the matrix so obtained and the presence-absence matrix, table Appx. 3.2.

It is a feature of the Robinson-Brainerd coefficient, when used in this way, that two cemeteries sharing a single type could be rated with a similarity of 200 (the maximum possible), if that were the only type present at each. Yet two other cemeteries, sharing several types in common, could be rated as less similar if they also possessed other types which were not common to both.

The laborious computations involved were accomplished by means of an IBM 7094 computer through the kindness of, and using the program by, Richard Kuzara, George Mead and Keith Dixon. This matrix, in the order resulting from computer seriation

by means of the program of Kuzara, Mead and Dixon (1966) forms table Appx. 3.3. However, for reasons of economy, the seriation conducted did not use all the procedures which their program allows, and this ordered matrix may not be the best which their method could produce. Since the matrix has been sorted, the cemeteries are listed in what should, on the basis of the assumptions underlying the method, be their chronological order.

As part of its output, the computer also presents its own original percentile incidence matrix, with the cemeteries now arranged in the order resulting from the computer seriation. This presents for each type of object in each cemetery the percentage contribution which that type makes to the total grave goods found in the cemetery. Cemeteries similar to Chalandriani in Syros are at the lower part of the incidence matrix (table Appx. 3.4).

It is possible to apply the procedures of close-proximity analysis to a matrix such as table Appx. 3.3 just as to a matrix with presence-absence similarity coefficients. When this procedure is carried out, using the similarity coefficients calculated by computer from the cemetery percentages, the configuration is as shown in fig. 9.3.

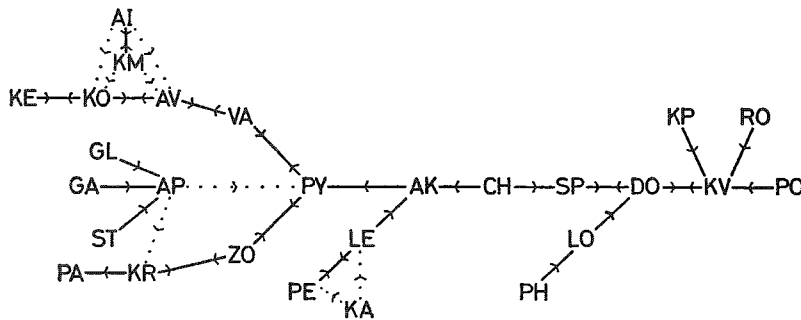


FIG. 9.3 Close-proximity structure for the Early Cycladic cemeteries using similarity coefficients calculated by computer (table Appx 3.3). Two cemeteries with low coefficients have been omitted.

Here now we see the answer which close-proximity analysis gives to the data contained in matrix Appx. 3.3. And, of course, the actual order of cemeteries in matrix Appx. 3.3 is the computer's own answer, after application of the Kuzura-Mead-Dixon seriation procedure. The close-proximity solution using the presence-absence similarity matrix was given in fig. 9.2.

It has thus been possible to apply three slightly different analytical procedures, each of which takes as its starting point the same data, namely the information contained in the incidence matrix, table Appx. 3.1. It is thus particularly satisfactory that the finds from Chalandriani, Kapsala, Karvounolakkoi, Spedos and Dokathismata are classed together by all three procedures. Polichni, Roön and Stavros are classed with these in some cases, and Roön and Stavros both show types relating closely to those of the others. And in all three procedures the key cemetery of Akrotiraki in Siphnos, which

contains material resembling both that from Pelos and from Chalandriani, occupies an intermediate position.

It is here proposed that the cemetery finds be divided, upon this basis, into two groups whose status as cultures will be argued in the next section.

The first of these is the Grotta-Pelos culture (or Pelos-Lakkoudhes culture, as Doumas would prefer to term it). The finds resemble those from Panaghia in Paros, Zoumbaria in Dhespotikon, Pelos in Melos and indeed all those cemeteries to the left of Akrotiraki in the three orderings given. The special status of the Aghios Nikolaos and Louros cemeteries is discussed in Appendix 2. The following types, as numbered in the incidence matrix (see the list in Appendix 3) may be classed as belonging exclusively to the Grotta-Pelos culture: 1 to 8 inclusive, 10, 11, 14, 15, 17, 19.

The Keros-Syros culture has types such as are seen at cemeteries listed to the right of Chalandriani on the three orders given (with the exception of Louros, which is discussed in Appendix 2). The following types in the incidence matrix thus belong to the Keros-Syros culture, and are not found in the Grotta-Pelos culture: 22, 23, 25 to 27 inclusive, 30 to 39 inclusive, 41 to 50 inclusive, 53.

We may note also that obsidian (type 9), palettes (13), marble bowls of simple form (16), stone rubbers (21), shells (28) and colouring matter (29, 51) are found in graves of both cultures, as may also be certain generalised categories (20, 24, 40, 52). Schematic figurines of both cultures were classed as type 18, although in fact the forms are somewhat different in the two cultures.

TABLE 9.1 Grave goods from the cemetery of Akrotiraki on Siphnos.

Grave	Grotta-Pelos types				Keros-Syros types			Other types					Other pots
	5	7	18	19	16	26	33	9	13	20	28	29	
143 upper	ROBBED												
143 lower					2		1		1				
142 upper					1	1							5
142 lower				3				1		1	1	1	
145 upper	1	1						1					
145 lower		EMPTY											
146 upper		1											
146 lower			1										

The division of cemeteries into Grotta-Pelos and Keros-Syros is already clear enough. However, it should be noted that as well as Akrotiraki in Siphnos, four other cemeteries of those listed have finds both of the Grotta-Pelos and Keros-Syros cultures (Apollona, Phyrroghes, Karvounolakkoi and Spedos; on the other hand type 34 has been shown in error as present at Krassades). In general, however, objects from the two cultural assemblages are not found in the same grave, or in the case of a double grave, accompanying the same burial.

This is well exemplified by a grave-by-grave consideration of the Akrotiraki cemetery. We see that the two graves contained goods of the Keros-Syros culture, and four had goods of the Grotta-Pelos culture. Indeed, of all the graves which have been studied from the cemeteries indicated, only in one single case do objects from the two different cultural assemblages occur together. This is Grave 38 B at Apollona in Naxos, where a marble-footed vessel (*kandila*) of type 14 was found together with a copper or bronze dagger of type 23 (Papathanasopoulos 1962, pl. 77–78). In so exceptional a case there may be some special explanation: perhaps the *kandila*, which is not in good condition, was an heirloom, already old when it was buried.

Further details of the analytical methods which have been used here will be found in a recent paper (Renfrew and Sterud 1969). The interpretation of the division of the cemetery material is discussed in the next section. For the present it is sufficient to conclude that the material does indeed divide very clearly into two distinct assemblages in this way. Most types can be ascribed specifically to one or other of the two cultures, and in consequence, when there are any grave goods at all, it is usually easy to decide to what culture the burial belongs.

The Early Cycladic culture sequence

Three groups of material of the Cycladic early bronze age have now been distinguished. It remains to investigate the chronological and geographic relationships between them.

The Phylakopi I culture is known, in the first instance, from both the settlement and the cemeteries at the type site in Melos. The second important settlement of the culture is at Paroikia in Paros. Finds of the same kind come from Siphnos, Amorgos and Naxos (figs. 12.2, 2; 12.1, 4; see fig. Appx. 1.2).

The Grotta-Pelos culture is known from cist-grave cemeteries throughout the central and southern Cyclades. As argued above, the settlement finds, with which the grave goods may be associated, come from the pre-city levels at Phylakopi, from Grotta in Naxos and from other sites in Amorgos, Siphnos and Melos. This may be regarded as a genuine archaeological culture, with a coherent distribution, and with finds from both settlements and cemeteries (see fig. Appx. 1.2).

The Keros-Syros culture is known again, in the first instance, from cemeteries in the northern and central Cyclades, with outlying finds (chiefly folded-arm figurines) from as far south as Ios and Thera. Several settlements are known, notably at Chalandriani in Syros, at Dhaskalio in Keros, on Mt Kynthos in Delos, and in Naxos. A number of unexcavated sites of this culture have yielded pithos handles with slashed incisions on the upper surface. The distribution of sites is again a coherent one. The Keros-Syros culture, like the other two, may be regarded as a well-defined culture of the Cycladic early bronze age.

The chronological relationship between the Grotta-Pelos and Phylakopi I cultures is easy to establish. Grotta-Pelos finds were found below Phylakopi I levels at Phylakopi

itself. And in Paros, the one major site of the Phylakopi I culture at Paroikia may be regarded as the successor of the many smaller sites of the Grotta-Pelos culture, just as Phylakopi I succeeded the Grotta-Pelos sites in Melos. Moreover, at Phylakopi the Phylakopi I culture develops without interruption into the middle bronze age Phylakopi II culture. It seems altogether logical to regard the Phylakopi I culture as belonging to the later part of the early bronze age in the southern Cyclades, and the Grotta-Pelos culture as falling within the earlier part of the early bronze age in both the central and southern Cyclades.

Turning now to the Keros-Syros culture, we have four lines of approach in seeking to establish its position with respect to the other two cultures. First there is some very limited stratigraphic evidence. Then there is the information yielded by the analysis of the cemetery assemblages in the last section; and thirdly the distribution of sites shown on fig. Appx. 1.2. And finally there is the information which may be afforded by the comparison of Cycladic finds with those from other areas. But in order to avoid circular reasoning at a later stage, this fourth source of information will be discounted here. The stratigraphic information for the Keros-Syros culture is so far extremely limited, coming solely from Phylakopi. As stated above, pottery apparently of the Keros-Syros culture was found stratified there in levels between those of the Grotta-Pelos and Phylakopi I cultures. It is to be hoped that further excavations in Naxos—where finds of both the Grotta-Pelos and Keros-Syros cultures are most common—will give a clearer stratigraphic documentation.

The distribution of the two cultures is interesting. There are no finds of the Grotta-Pelos culture in the northern Cyclades (e.g. Syros and Mykonos), while Keros-Syros finds scarcely occur on Paros or Antiparos (although there are a few from Dhespotikon). Finds of both cultures are common on Naxos. Thus, although the distributions are not identical, they are not complementary. In particular, the Keros-Syros culture finds in south-east Naxos, in Keros and in Amorgos discourage any attempt to claim the Keros-Syros culture as 'north' and the Grotta-Pelos culture as 'south', in the manner of some scholars. It should be noted too that a jar with stamped decoration resembling somewhat the footed jars of Syros, has been found at Phiropotamos in Melos (pl. 8, 9).

Indeed the detailed analysis in the last section rules out any attempt at a solely geographical division. If the locations of the cemeteries in fig. 9.3 are considered, and the names of the cemeteries replaced by those of the islands on which they are located, the diagram, fig. 9.4, is obtained (N indicates Naxos; P, Paros; D, Dhespotikon; O, Antiparos (Oliaros); A, Amorgos; S, Siphnos; Sy, Syros; M, Melos).

No coherent pattern emerges from this exercise, and it is clear that the differences between the cemeteries cannot be explained solely or even principally by a geographical factor. On the contrary, while the Paros cemeteries lie on the left side of the diagram, and the Amorgos ones to the right (suggesting perhaps some east-west variation), Siphnos, which lies between these on the diagram is geographically far to the west of Paros. And of course the Naxos cemeteries are widespread throughout the diagram. There is little systematic geographical clustering.

An obvious alternative hypothesis is that the variation is largely a chronological one. On this view the Keros-Syros culture would not be the contemporary of the Grotta-Pelos culture, but largely later (or, alternatively earlier) in date. The limited stratigraphic evidence from Phylakopi, and the frequency of metal finds in Keros-Syros contexts document that if the two cultures are in succession, the Keros-Syros culture will be the later of the two.

The distinction between the two cultures must surely have a chronological significance, for otherwise it is difficult to see how such a rigid separation could occur as in the cemetery at Akrotiraki, where graves 145 and 147 are of the Pelos group and 142 and 143 of the Syros group. A similar situation is seen at the cemeteries of Karvounolakkoi

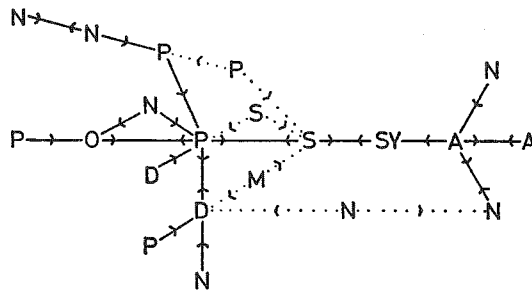


FIG. 9.4 A test to determine whether the close-proximity structure for the Early Cycladic cemeteries (fig. 9.2) is determined by their geographical distribution. In each case the name of the island where the cemetery occurs has been substituted for the name of the cemetery itself. No coherent pattern emerges: the structure is not based on distribution, but reflects cultural (and perhaps chronological) factors.

and Phyrroghes in Naxos. The notion of a Grotta-Pelos people and a Keros-Syros people living together in the same settlement and yet retaining a rigid difference in cultural forms and in grave goods, seems difficult to accept. Far more plausible is the replacement of the Grotta-Pelos customs in the settlement by those of Keros-Syros, conceivably with some change in the population, but without a total break in continuity.

The rather scanty stratigraphical evidence provided by Phylakopi on this point is thus supported by the pattern of associations in the cemeteries. However, the evidence derived from comparisons with other Aegean cultures is in some ways weightier. The close ties of the Keros-Syros culture with the Korakou culture of the mainland, with Troy II-IV and with Early Minoan II will be illustrated in chapter 13. They depend largely on the *Urfirnis* 'sauceboats' and one-handed jugs, and the folded-arm figurine. The Grotta-Pelos culture has links, on the other hand, with the final neolithic of the mainland as well as the Eutresis culture, with Kum Tepe Ib in the Troad, and with Early Minoan I in Crete, as will be seen in chapter 13. These synchronisms do not rule out the survival of the Protocycladic cultures into the middle bronze age, as is demonstrated by the Amorgos daggers and by the find of imitation Middle Minoan cups in a cist grave at Aïla in Naxos (Papathanasopoulos 1962, pl. 63).

It is noticeable that the rigorous division in material is not followed by the grave forms. The built graves of Syros are found again only at Lionas in north-east Naxos and apparently at Dhiakophtis in Mykonos. Objects of the Keros-Syros culture are often found in cist graves. Sometimes in Siphnos and Naxos, as described, they are found in the same cemeteries as the earlier Pelos material (but generally not in the same graves). This suggests that where the Keros-Syros culture followed upon the Grotta-Pelos, the transformation was a peaceable one with continuity in settlement and in burial practice, so that although new grave goods came into fashion, the traditional tomb construction was retained. It is thus probable that the early phases of the Keros-Syros culture, doubtless in Syros, were contemporary with the developed Grotta-Pelos culture. And it is clear too that the later Keros-Syros culture, in Amorgos at least, must have overlapped in time with the Phylakopi I culture (cf. chapter 11). It is not indeed impossible that the Phylakopi I culture followed directly on a very late stage of the Grotta-Pelos culture in Melos and Paros, since Keros-Syros finds are so scarce on those islands, although a complete cultural break is also quite conceivable. In Syros, Siphnos and Keros and apparently Naxos, the Phylakopi I culture is scarcely seen, so that the Protocycladic cultures may have lasted there until the middle bronze age. These chronological relations are schematically represented in table 9.2. It has been compiled using the information given in the Gazetteer, Appendix 1. Further research may eventually fill some of the apparent lacunae. The basic cultural divisions are further discussed in the next three chapters.

TABLE 9.2 The early prehistoric culture sequence in the Cycladic islands. G-P indicates Grotta-Pelos culture; K-S, Keros-Syros culture; Phyl. I, Phylakopi I culture.

THERA	MELOS	PAROS ANTIPAROS	NAXOS SIPHNOS	AMORGOS KEROS	SYROS MYKONOS	KEA	AEGEAN CALENDAR DATE B.C.
M.M./ Phyl. II	Phyl. II	Phyl. II	M.B.A.	?	M.B.A.	M.B.A.	M.B.A. c2100/2000
Phyl. I	Phyl. I	Phyl. I	Phyl. I	Amorgos g.p.	Kastri g.p.	Kastri/ Lefkandi I g.p.	E.B.3 c2400/2300
K-S	? K-S	Plastiras + Kampos g.p.	K-S	K-S	K-S	Korakou	E.B.2 c2700
G-P	G-P	G-P	G-P	G-P			E.B.1 c3200
						Kephala	FINAL NEO

Broadly speaking, however, the sequence Grotta-Pelos, Keros-Syros, Phylakopi I seems supported by the Phylakopi stratigraphy, the cemetery associations and the Aegean parallels. These cultures will be discussed in turn in the three succeeding chapters.

Chapter 10

The Grotta-Pelos Culture



The chronological and geographical position of the Grotta-Pelos culture in relation to the other early Cycladic cultures has been established in the last chapter. It remains now to look at the Grotta-Pelos finds in further detail, and to establish their position in relation to other Aegean cultures.

Internal variation

It is an unfortunate circumstance that at the only two excavated settlements of this culture, no early graves have been discovered. The inevitable consequence is that, although the correlation of the Grotta and Phylakopi O settlements with the Pelos type cemeteries seems well assured—as discussed in the last chapter, and again below—we are not able to make more detailed subdivisions of the settlement material into groups or phases corresponding to those of the cemeteries. On the other hand, the cemeteries do indeed show significant clustering of finds, and comparative material is rather abundant, especially in west Anatolia, which makes the chronology rather easier to establish.

The important cemetery of Lakkoudhes in south-west Naxos, recently excavated by Doumas (1962) has yielded abundant finds resembling those of Pelos, but possibly earlier, and in the excavator's view more typical of the cemetery assemblages as a whole (personal communication, January 1970). For this reason he would prefer to designate the culture by the term Pelos-Lakkoudhes rather than Grotta-Pelos. We may thus regard the terms Grotta-Pelos culture and Pelos-Lakkoudhes culture as alternatives, referring to the same body of material.

In addition to the usual incised pottery pyxides and jars, common in many of the cemeteries, including both Pelos and Lakkoudhes, two further groups of material may be distinguished, named after the important finds at Plastiras and at Kampos (Aghios Nikolaos), both in Paros.

The Plastiras group designates the recurrent assemblage of marble objects found especially in Paros and neighbouring islands. Chief among them are the flat-based beaker or rhyton (fig. 10.4, 4; pl. 1, 4), the footed marble *kandila* (fig. 10.3, 4; pl. 1, 3), the Plastiras figurine described in chapter 9 (fig. 19.5; pl. 2, 2) and sometimes the various schematic marble figurines (fig. 19.4; pl. 2, 4–5). The group and its associations are discussed in Appendix 2. There are grounds for setting it late in the span of the Grotta-Pelos culture.

The Kampos group is less well defined. Its principal form is the Kampos type of ‘frying pan’ (pl. 4, 1) which must clearly be distinguished from the ‘frying pans’ of the Keros-Syros culture (see Appendix 2). The only well-stratified clay bottle from the Cyclades came from the Kampos cemetery itself: the form is important for its occurrence as an import in Crete (pl. 5, 3–6). The richest of all the Grotta-Pelos graves, at Louros in Naxos, contained a ‘frying pan’ related to the Kampos type. With its silver beads and copper awls it is probably to be set towards the end of the period of the Grotta-Pelos culture. The only stratified occurrence of the marble arm-stump figurine (pl. 2, 1) was in the Louros grave.

The settlements

The first Grotta-Pelos settlement to be excavated was Phylakopi (Atkinson et al. 1904). Only an exceedingly brief note of Welter’s discovery of ‘sub-neolithic’ material at Grotta in Naxos was published (Karo 1930); since the Second War Kontoleon has been excavating at that site. Although difficult conditions made the stratification very obscure, extensive building remains were unearthed (Kontoleon 1949), and it proved possible to reconstruct from sherds several complete vessels. Similar but fragmentary material turned up in pits excavated by Tsountas (1898) at Kato Akrotiri in Amorgos, and although the purpose of these pits is not clear it seems most likely that they are the preserved features of a settlement that has otherwise been much eroded away. Dumas (1962) excavated the cemetery of Aghioi Anargyroi in Naxos and discovered nearby quantities of Grotta type pottery (fig. 10.1, 5). Similar sherds have recently been picked up during site survey near the cemeteries of Pelos and Aghios Pandlemon in Melos (fig. 10.1, 8), Aila in Naxos (fig. 10.1, 7 and 9) and Akrotiraki in Siphnos, and Dumas has found comparable settlement material near destroyed cist graves on the Ano Kouphonisi (pl. 4, 3–6).

The most characteristic feature at all these sites is a thick and heavily burnished dark faced ware, in which the dominant shape is the bowl (pl. 4, 2, and fig. 10.1). Usually the bowl has horizontally pierced tubular lug handles which are almost inevitably set some way below the rim (fig. 10.1)—a significant feature since this does not hold for the related eastern Aegean wares. Very characteristic too is the thickening or rolled rim, which never becomes just an inturned rim, but this feature is by no means found on all the bowls. A selection of Cycladic bowl shapes is given in fig. 10.1, mostly from Grotta

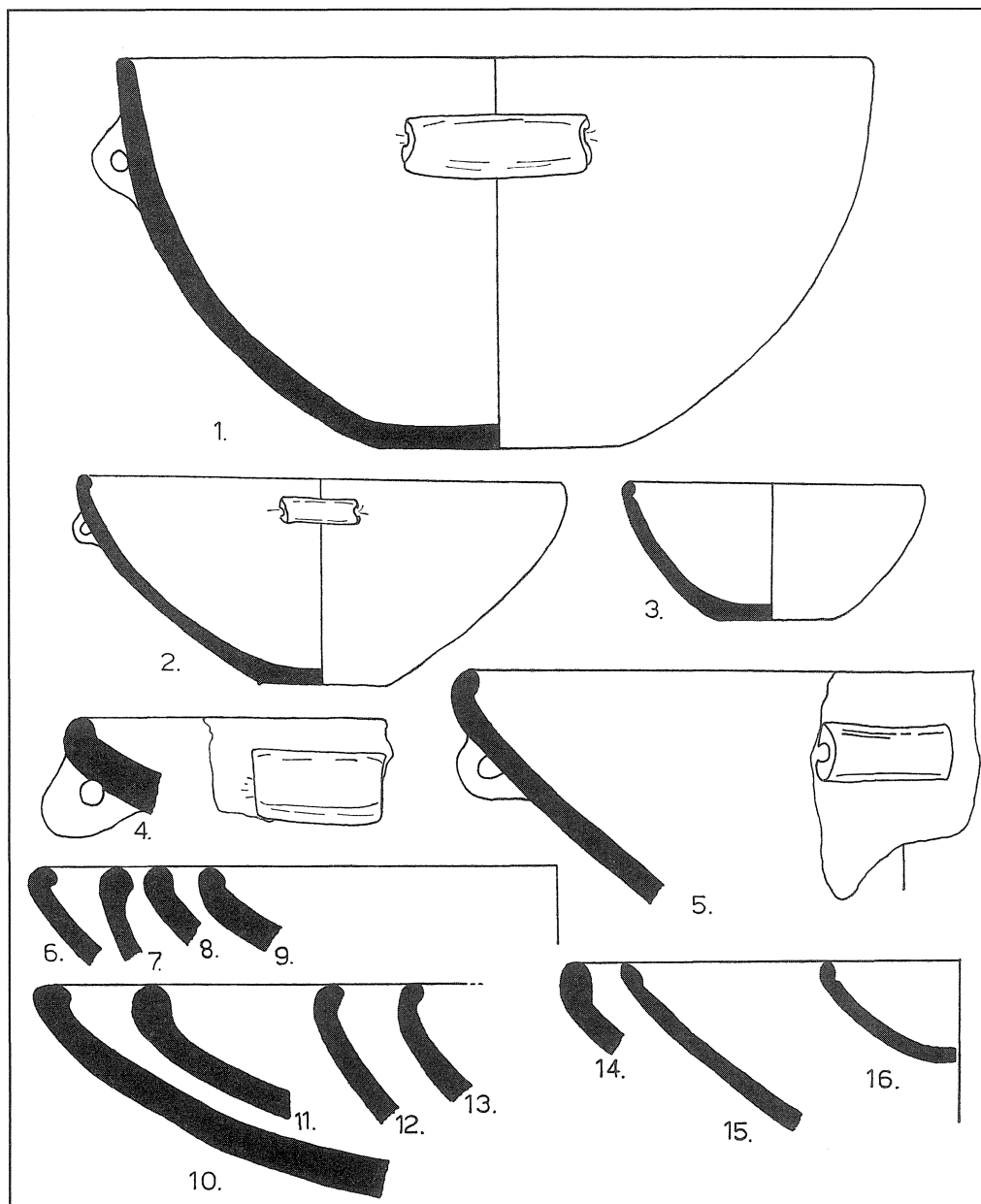


FIG. 10.1 Bowls from settlements of the Grotta-Pelos culture (see notes to the figures).
Scale c. 2 : 5.

and Phylakopi O; nos. 5–9 are from other sites. A further example from Phylakopi is illustrated with sherds from Mykonos in a recent article (Belmont and Renfrew, 1964, fig. 3).

But although the bowl, often with its rolled rim and tubular lug handles, is the most easily recognised in the fragmentary state, several other traits are significant. When Mackenzie recorded the pottery from the lowest layers of pre-City Phylakopi, in addition to mentioning the bowl with horizontal lug and generally ‘with rim slightly projecting upward and hand polished all over the surface’ (Mackenzie 1963 [DB 1898, 24]), he specified fragments with raised bands which were decorated with herring-bone incisions. Such sherds from pithoi, which indeed generally show the pinkish slip observed by Mackenzie, have been found at Grotta (fig. 10.2, 13) and at settlements near several of the Pelos cemeteries. The coarse and unburnished pots with unpierced lug handles described by Mackenzie are likewise a common feature (fig. 10.2, 3 and 9). A comparison of the various forms from Grotta (right) and Phylakopi (left) is shown on fig. 10.2, and at both settlements fragments of suspension pots (nos. 1 and 7) of the kind noted by Mackenzie which are common also to the cemeteries (fig. 10.4, 6 and pl. 3, 5) are seen. Another object found in the cemeteries is the marble bowl (fig. 10.2, 6 and 12). The necked jar is seen at Phylakopi and Grotta (fig. 10.2, 2 and 8) as well as at Kum Tepe (fig. 5.3, 10), and at both sites the ‘cheesepot’—a coarse vessel with a line of holes pierced below the rim—is seen (fig. 10.2, 5 and 11). This is a form rather characteristic of the later neolithic of the Aegean (Belmont and Renfrew 1964, 398).

It is thus possible to speak now of a cultural assemblage rather than to attempt comparisons solely on a single dominant form. But only at Grotta is there a series of completely restored shapes, and these include a cooking pot on tripod legs (cf. Lamb 1936a, pl. IX, 440) and a broad bowl with a flat out-turned rim like those of the north-west Anatolian cultures (Lamb 1936a, pl. XVI, 2, top row), although the decorated surface is flatter at Grotta than is usual at Thermi. At Grotta were also found sherds of Kampos-type frying pans and one each of the Syros and Mainland types. Otherwise however there was no incised ware. Its absence is curious, and can perhaps be explained by a predominantly funerary use, and it is this feature which has delayed recognition of the complementary status of the cemeteries and settlements, although this was indeed pointed out by Mackenzie (1963) and Edgar (in Atkinson et al. 1904), half a century ago.

Unfortunately, few traces of buildings have as yet been recovered. Tsountas uncovered both rectangular and curved walls at Pyrgos in Paros (1898, 170), but the information which he gives is tantalisingly brief. Two phases of construction were represented. The pottery included jars with tunnel lugs (*ibid.*, pl. 9, 29 and 38), pithos fragments with handles bearing parallel slashes or incisions (*ibid.*, pl. 9, 37) and a sherd with incised lines, impressed triangles and impressed spiral decoration (*ibid.*, pl. 9, 10). Trachyte saddle querns were found, as well as terracotta spindle whorls and blades and flakes of obsidian.

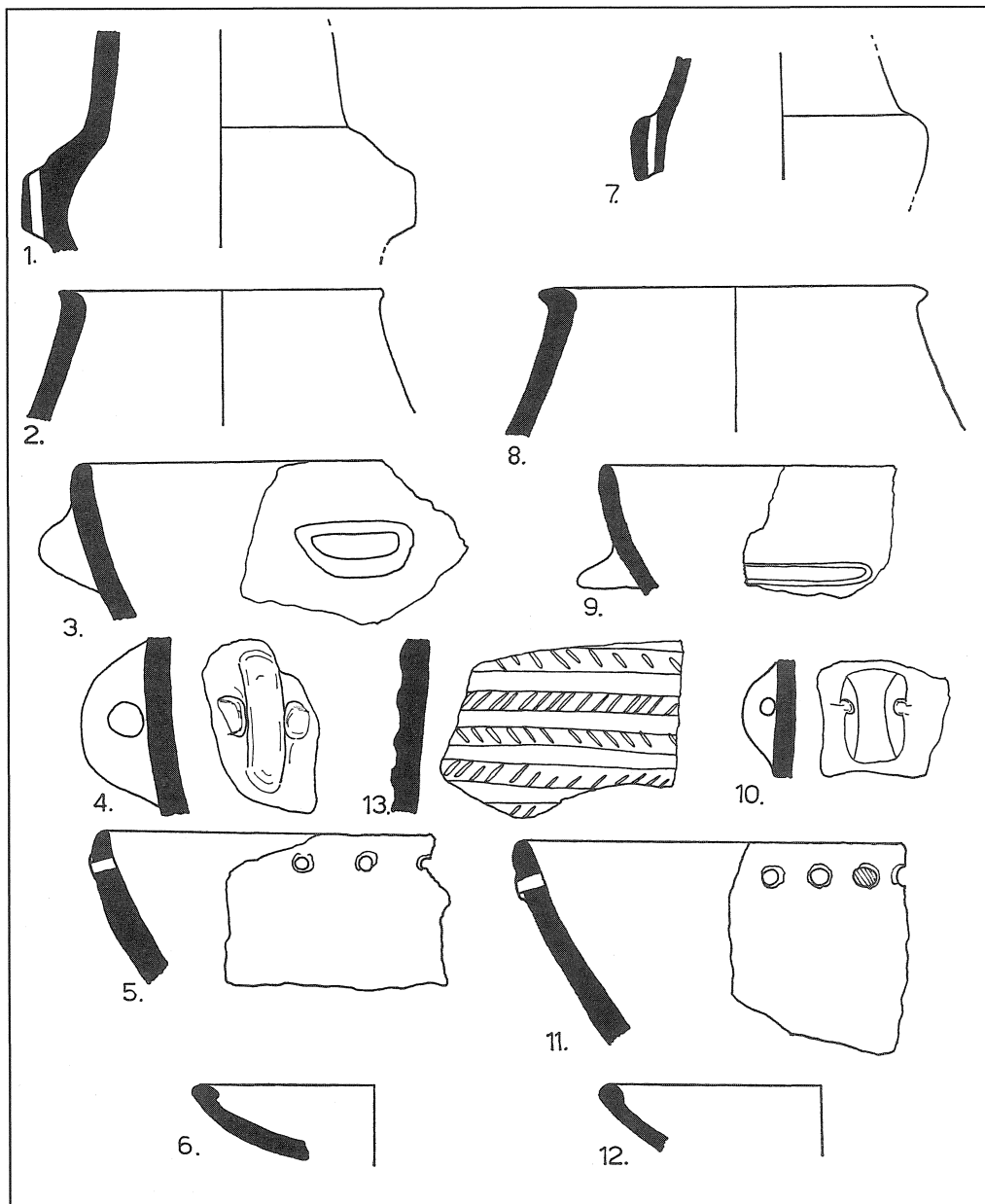


FIG. 10.2 Comparison of Grotta-Pelos forms from Phylakopi (1-6) and from Grotta in Naxos (7-13); Nos. 6 and 12 are marble. Scale c. 2 : 5.

Recently at Zoumbaria in Dhespotikon, Zapheiropoulos has found traces of an enclosing wall, possibly a fortification wall, at the settlement. But in view of the several Keros-Syros finds from the island, this may be rather later in date.

Traces of settlement are naturally to be found close to most of the Grotta-Pelos cemeteries, and, as reported above, sherds have been collected from some of them which resemble those from Phylakopi O and Grotta. At the settlement at Ayvssos, near the Grotta-Pelos cemetery, Tsountas found traces of copper slag (Tsountas 1898, 176), and a fragment of lead was collected from the remote and isolated settlement at Cheiromylos on Dhespotikon (Renfrew 1967a, 4; cf. Tsountas 1898, 176).

Finally, mention should be made of Kato Akrotiri in Amorgos, where Tsountas excavated several pits containing pottery and other finds, without however finding buildings or positive traces of settlement (Tsountas 1898, 166). The finds included heavy burnished pottery, especially open bowls, with the horizontally pierced tunnel lugs so common at Phylakopi O and Grotta (pl. 4, 2; *ibid.*, pl. 9, 17). He also found fragments of spherical pyxides, and lids of cylindrical pyxides as well as jars comparable with those of the Grotta-Pelos graves (Tsountas, pl. 9, 3 and 9). There were fragments of a frying pan of Kampos type (*ibid.*, pl. 9, 16). On the other hand two jugs and a 'sauceboat' of coarse pottery may be later in date (*ibid.*, pl. 7, 19 and 20).

Although the evidence from the Grotta-Pelos settlements is somewhat scanty, it is clear that in general they were located close to the sea, often on a low promontory, with the graves on the slopes below and behind the settlement (cf. Fig. 14.15).

The cemeteries

The incredible wealth of material preserved from the early periods of the Cyclades is due to a single factor: the practice of inhumation together with grave goods, below the ground in an almost indestructible container of stone slabs. Only the rock-cut tomb is as efficient a means of preserving the buried remains for the after-life—or at least for posterity—and the cist graves are particularly suitable in that they now give no obvious indication above the ground of their presence. Again since they contain precious metals only rarely, they were not plundered in antiquity, and it is only of recent years that the fantastic market value of the marble objects has led to large-scale illicit excavations. These regrettable depredations and the subsequent trade are still widely conducted, and the loss to archaeology has been incalculable. For instance, had all the human bones been properly excavated and preserved, we would have remains, sometimes fragmentary, of many hundreds of individuals. The loss to physical anthropology is comparable only with the sacking of the Hal Saflieni hypogeum in Malta. The associations too have been destroyed—the pottery is rarely kept anyway—and the early published work of Tsountas is still the best we have from that point of view. The little museum of Apeiranthos, largely due to the foresight and ingenuity of Mr M. Bardanis,

is a splendid creation yet it is odd that the principal collection of Cycladic antiquities formed since the war should consist in part of objects which the 'archaiokapiloi' have failed to sell.

Despite the magnificent dream of what might have been, what remains is sufficient today for a reliable division of the material. And it is important to mention the valiant efforts of the Cycladic representatives of the Greek Archaeological Service, Dr and Mrs N. Zappeiropoulos, Mr C. Doumas and their colleagues who have saved so much material for archaeology. Mr Doumas's excavations at Lakkoudhes and Aghioi Anargyroi (1962) as well as at Akrotiri, also in Naxos, and Plastiras in Paros, have set a new standard, and provided important new associations.

The known cemeteries of the Grotta-Pelos culture are listed in the Gazetteer. Doubtless many of the plundered cemeteries, where only the presence of cist graves but not the finds themselves are now documented, belonged to this culture. Only two cemetery plans are available. At Orecheion Kalogries in Melos 12 cist graves were found, 2 or 3 m apart, and of triangular or trapezoidal shape (Papadopoulou 1965, 510).

At Aghioi Anargyroi in Naxos (fig. 19.9), 22 cist graves were found containing graves of the Grotta-Pelos culture (Doumas 1962, 273). The cemetery had an enclosing wall, and the position of the graves was originally marked by a number of flat stones above each one, just as at the late neolithic cemetery of Kephala in Kea. (At Akrotiri in Naxos one of the vertical slabs of the cist was frequently taller than the others, and apparently projected above the ground surface [Doumas 1963, 278].) Some activity at Aghioi Anargyroi beyond actual burial, and presumably of a religious nature, is indicated by a number of large open pottery bowls, of curious hat-like shape and with a flaring rim, which were found in the cemetery (Doumas 1962, pl. 333, b).

At this time the cemeteries did not apparently contain more than about 50 graves (56 are recorded at Kambos tis Makris in Naxos, and about the same number at Krassades in Antiparos). Cemeteries of about 20 graves are common, and in some cases (for example at Kamares in Paros) fewer than 10 have been found.

At Leivadhi in Dhespotikon, Tsountas reported three separate groups of graves (1898, 141), the first consisting of six double graves (which he regarded as family graves), the second, lying some 50 m distant, of four graves, and the third of eight or nine. It has been suggested that the arrangement of burials in this way represents some social grouping, perhaps of clans, in the settlement (Doumas 1969, 14).

Most Cycladic graves contained only a single burial. But double graves, with a lower compartment separated by a horizontal slab from the upper compartment, regularly occur. Doumas has suggested that the lower grave served as an ossuary for earlier burials while the upper grave contained the most recent burial, perhaps from the same family as the preceding ones. These double graves contain the remains of from two to eight persons: they are an indication not of collective burial but of multiple burial. The same practice is seen at an earlier date at Kephala in Kea.

The cist graves generally consist of four upright slabs in a trapezoidal arrangement, and covered by a fifth slab (pl. 25, 1). Often one side consists of dry-stone walling in-

stead. In some cases there is a slab at the bottom of the grave also, but more often the deceased lay directly upon the underlying soil or rock, or sometimes upon a bed of pebbles. The graves are often less than a metre long, and the deceased was buried in contracted position with the knees drawn up towards the chin, lying on his right side (Doumas 1962, pl. 334, b). There was no consistent orientation. Often there were no grave goods whatever. But in other cases the objects accompanying the burial were placed beside the head, sometimes with others at the feet.

Tsountas in most cases describes the burial circumstances in some detail. Grave 117 at Krassades in Antiparos, although with richer finds than most, is in other ways rather typical (Tsountas 1898, 117):

'Measurements 116 cm by 66 cm by 42 cm. The head lying in the far left corner. In front of it was found a marble vessel (type 15). Towards the far right corner, at the feet of the deceased, were thirteen schematic marble figurines (type 18) and a small marble bowl of diameter 5 cm (type 16).'

Grave 124 at Leivadhí in Dhespotikon, a typical double grave, is described as follows:

'Double. Measurements of the upper, 123 cm by 95 cm. Total depth 65 cm. Near side built of small stones. In the upper part were two dead with the skulls against the left and right sides respectively of the grave. In the lower graves was a heap of bones, a spherical pottery pyxis with incised decoration (type 7) and pieces of an obsidian blade.'

It is from finds such as these that the bulk of our information about the Grotta-Pelos culture comes. The range of finds from the graves has already been discussed (see also Appendix 2). With the exception of the 'frying pans', with their incised spirals, the incised decoration of the pottery is essentially rectilinear, and of limited repertoire. The main range of shapes from the cemeteries is given in the list in Appendix 3. Of the three important marble shapes (pl. 1, and fig. 10.2, 6 and 12), the commonest is the open bowl, often with a rolled rim (like the pottery bowls), and sometimes with a single horizontally-pierced lug handle (Doumas 1969, no. 61). The other shapes are the flat-based beaker and the footed jar already discussed.

The marble figurines (pl. 2) fall into three main classes: the schematic form, the arm-stump figurine of Louros type, and the more complicated Plastiras type. The last two have been discussed above, and in a recent paper (Renfrew 1969a, 6 f.).

The schematic figurines are always *Brettidole*—flat pieces of marble without any relief, although occasionally the waist and the pubic triangle may be indicated by incisions. Several varieties have been recognised: they are clearly distinguishable from the schematic figurines of the Keros-Syros culture—the Apeiranthos type (fig. 19.4, vi), and of the Phylakopi I culture (pl. 8, 6–8; fig. 19.4, vii). They differ also from the approximately contemporary *Brettidole* of west Anatolia (the Beycesultan, Kusura and Troy types) and of Crete (the Aghios Onouphrios type).

The violin form, the notch-waisted form and the shouldered form (fig. 19.4, 1) are variants upon a single theme—a schematic representation of the human body without

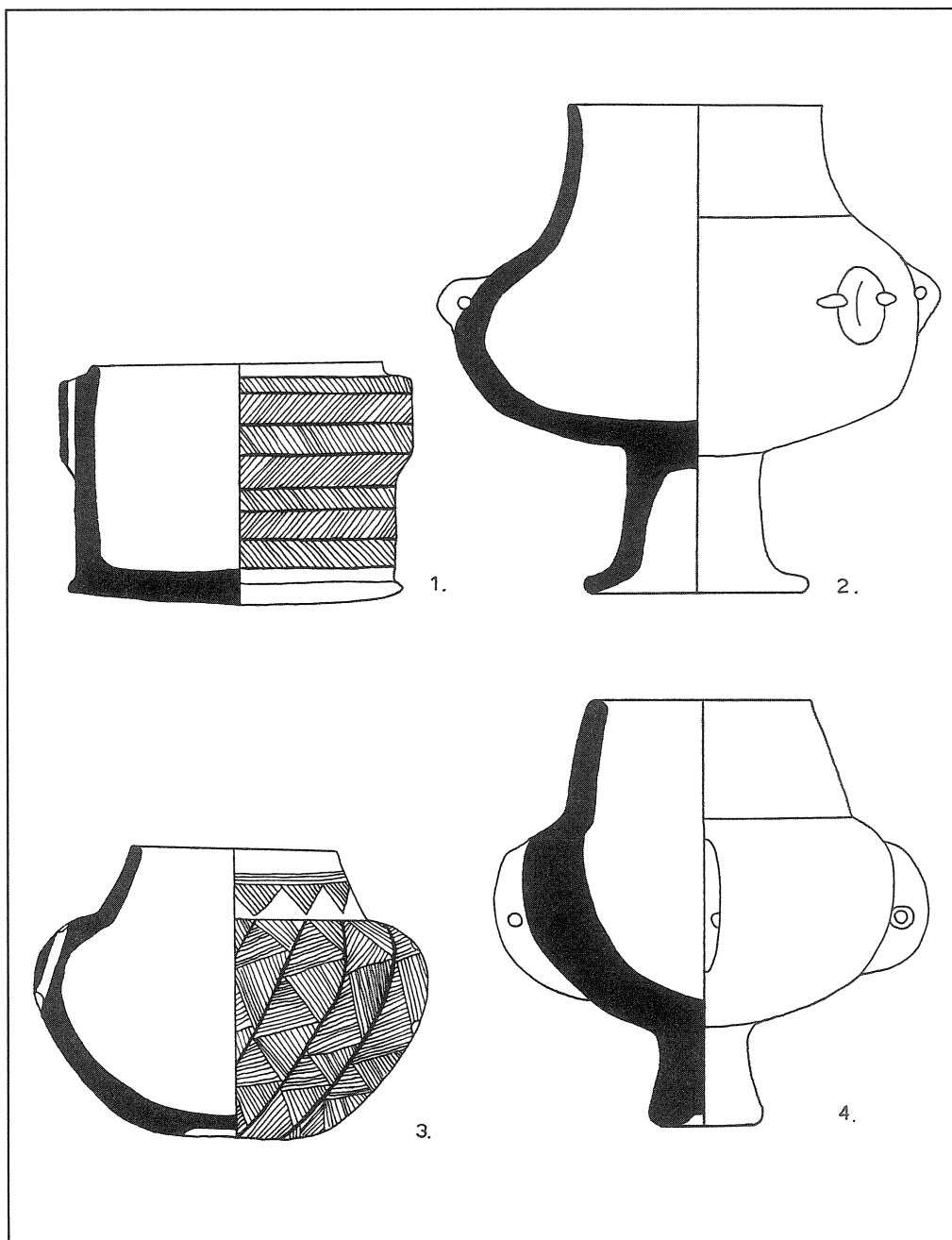


FIG. 10.3 Vessels from the Grotta-Pelos cemeteries; no. 4 is of marble. Scale 2 : 5.

any indication whatever of the legs or head. Form 1D, the pebble form, is hardly more than a flat, unworked stone, although it may have been polished: were it not for its inclusion in the graves it would not be worth notice. Form 1E is more stylised, with its two or three notches at each side dividing it into three or four lobes. One example is from grave 117 at Krassades on Antiparos (Tsountas 1898, pl. 11, 15), and another comes from the Akrotiri cemetery on Naxos. Similar forms have been found in the Early Bronze 1 and 2 levels at Beycesultan (Lloyd and Mellaart 1962, fig. F.1, 15–17; pl. XXII, 2–3).

Clearly, despite the local variations, the practice of making schematic *Brettidole* was shared by the Cyclades, Crete and west Anatolia: there are also examples from Kea and Attica. This need not, however, suggest the rapid spread of an idea from a single source, since there is a long tradition of figurine production in neolithic Crete (Ucko 1968), while a *Brettidol*, very like the later shouldered form, was found at neolithic Saliagos near Antiparos (Evans and Renfrew 1968, fig. 88, 4–7 and pl. XLIII, 3–5).

It is noteworthy that sometimes several of these figurines were included in a single burial. Grave 117 at Krassades in Antiparos contained 13 and Grave 103 at Pyrgos in Paros 14 of such marble *Brettidole*, of various forms (Tsountas 1898, 159 and 162). They occur both with pottery, and with marble vessels, which are not themselves mutually associated in the same graves.

The stone beads complete the repertoire of finds, since with the exception of the Louros find and of some copper wire from Grave 56 at Pyrgos in Paros (*ibid.*, 156), metal objects do not occur in the Grotta-Pelos graves. The beads are from a variety of attractive local stones. Most are simply spherical or cylindrical pebbles pierced for suspension. Two beautiful bird beads were found in a grave of the Pyrgos cemetery in Paros, and another at Zoumbaria on Dhespotikon in a grave containing also what is apparently a pig bead as well as some 50 others of simple form.

Two further shapes are of note: a simple lobe constricted at two places to produce a raised ring near the end (*ibid.*, pl. 8, 26, 39 and 50), and a pendant form terminating in a pair of spherical protuberances which has been likened to the male genitalia (*ibid.* pl. 8, 28, 37 and 38). Most of the beads have come from the Paros-Antiparos island group, and these special forms are restricted to the Grotta-Pelos culture.

This short chronicle, together with the discussion in Appendix 2, completes the description of the very restricted range of types found in the Grotta-Pelos cemeteries.

Affinities of the Grotta-Pelos culture

While some of the Grotta forms such as the ‘cheesepot’ have a rather widespread distribution, others are restricted almost exclusively to the Cyclades. Such types as the Kampos ‘frying pan’ or the marble bowl with rolled rim (common also to the Keros-Syros culture) are essentially limited to the islands, Euboia and east Attica. It is only when we turn to the burnished pottery bowls that wider affinities become apparent. The diagnostic value of this type was first pointed out by Mellaart (1960) and empha-

sised by French (1961) to whom we owe our knowledge of its importance and distribution in north-west Anatolia. He has defined a Kum Tepe Ib culture on the basis of these rolled rims and lug handles which is now well documented for north-west Anatolia. Its status in mainland Greece is less clear, however, and there are forms in Anatolia that are not seen in the Cyclades, so that conclusions based on this single form must be tentative when applied to the Aegean in general.

So far very little pottery has been published from Kum Tepe (Koşay and Sperling 1936, 41), but it has fortunately been possible to study the finds in the Istanbul Museum where the bulk of the excavated material is kept (boxes 362–67). In fact it is not very abundant: there is only one white-painted sherd and four with pattern burnish altogether from the Kum Tepe Ia levels. In addition both the rolled rim (fig. 5.3, 4) and the horizontally pierced handle (fig. 5.3, 1), supposedly diagnostic of Kum Tepe Ib, are already found in the Ia phase. So it cannot be claimed that there is at Kum Tepe any very good stratigraphical evidence for a Ia as distinct from a Ib culture. But the absence of 'Kum Tepe Ib' pottery at Beşikatepe, or Tigani in Samos, where similar burnished ware is found, does none the less give general support to the idea of an earlier phase with pattern burnish. What is now needed is the excavation of a site that would provide more than just a handful of sherds of the appropriate pattern burnished ware.

Of far greater significance therefore is the stratigraphy at Emborio in Chios. Here it is possible to see the development of thick and heavily burnished ware (fig. 5.2) from the thinner profiles of phases X and IX and ultimately from those of Aghio Gala (fig. 5.2, 1) which have obvious similarities with Hacilar forms. It is possible too to see more clearly the evolution of the thick burnished ware from bowls of phases VII and VI to the Troy I type bowls of phases IV to I with their positively inturned rims, a diagnostic feature likewise at Kum Tepe Ic (fig. 5.3, 11).

In dealing with this pottery it is useful to distinguish two types, both seen at Kum Tepe and Emborio. The first is the rolled rim bowl with its horizontal tubular handle set below the rim, as seen at Kum Tepe (fig. 5.3, 7 and 9), Emborio (fig. 5.2, 8), and in the Cyclades (pl. 4, 2, and fig. 10.1, 2). At Emborio it appears in Phase VII and disappears after Phase VI.

The second is similarly a bowl, but here the thickening rim is produced by a broad groove on the outside, set below the rim (fig. 5.2, 5, 6 and 11). The handles of this type are set to bridge the groove, and are consequently placed at the rim itself. They frequently bulge above the level of the rim, giving a horned (fig. 5.2, 11) or trumpet (fig. 5.2, 14) effect. At Emborio the evolution of the type can be traced from phase VIII (earlier therefore than the first type) through to the exaggerated shapes of the Troy I period. By then the rolled rim with the below rim lug has died out completely. At Poliochni I, just prior to Troy I, where the rolled rim is not found, this form is indistinguishable (fig. 5.3, 14 and 15) from varieties elsewhere that are far earlier in date.

This horned form of pierced lug, set at the rim, is essentially limited to north-west Anatolia, and its reported presence in Macedonia must be considered the product of an overland spread. It is not seen in the Cyclades.

In mainland Greece the rolled rim with horizontal lug set below (i.e. the first type) occurs at Athens (French 1964, fig. 9, 1–5) and rolled rims occur in the late neolithic of Lerna II (fig. 5.3, 12 and 13). Although the rolled rim is not of widespread occurrence of the mainland, heavy burnished ware is a prominent feature of the final neolithic, where it is probably an ancestor of the slipped-and-burnished ware that is the principal feature of the Eutresis culture. Good specimens were found in Goldman's excavations at Eutresis (1931, fig. 114.1) but it is Caskey's recent excavation which has really made its position clear. It is most abundant in Group II, where pierced horizontal tubular lugs set below the rim are common, and survives to Group IV. In Group V it is succeeded by the red slipped-and-burnished ware of the Eutresis culture. Very similar forms, likewise often without the rolled rim are frequent in the Cyclades, and are seen at Emborio, but at Kum Tepe this very straight rim without thickening is not found.

It is of course easy to list these similarities of form: their interpretation is a more difficult problem. The rolled rim, and the horizontal tubular handle (of both types) are features that are not seen at any other time in the Aegean, so that although the existence of heavy burnished ware need not be overvalued, the presence of these traits does seem significant. The distribution too is a homogeneous one (fig. 10.6): although the horned lug is basically Anatolian, the rolled rim with lug set below are features whose distribution extends from Kayışlar to Athens. French's emphasis on the significance of the form must be accepted, although it is perhaps possible to await further examples from Thessaly, Macedonia and Thrace before recognising it as a very important feature in these regions.

Once again the distribution is a coastal one, and the greater density in north-west Anatolia does suggest an Anatolian origin. However, it is perfectly possible that the form evolved side-by-side there and in the Cyclades, which would account for the local variations. Chronologically the link is important: it sets the Grotta-Pelos culture as contemporary with Emborio VII, Kum Tepe Ib and Eutresis Group II. It is thus earlier, in origin at least, than Troy I and the Eutresis culture, and in Aegean terms it is a final neolithic culture. Clearly it does survive into the early bronze age, but its early date is emphasised by the find of a marble rhyton at Kephala. It has long been suspected, especially by Weinberg (1954, 194) that the Pelos group could be extended backwards to fill part of the later neolithic period for the Cyclades, and it is satisfactory that evidence for this adjustment is now available.

Turning now to the cemeteries, links with the Greek mainland are surprisingly few in view of the earlier and later traditions of Attic-Cycladic connections. Two suspension pots were found by Theochares (1952a, 111 and 112) in a pure Eutresis culture context at Palaia Kokkinia, and they have a decidedly Cycladic look. Schematic figures of Cycladic type are known from Attica and there is the Kampos-type 'frying pan' sherd from Manika (pl. 4, 12). Otherwise similarities, even at Aegina, are very few.

Relations with Crete, previously notable chiefly for their scarcity, do seem to have been established at this time. The schematic figurines and the pyxides (pl. 5, 1–2) are discussed in chapter 13. It seems certain however that the Cycladic bottles and those

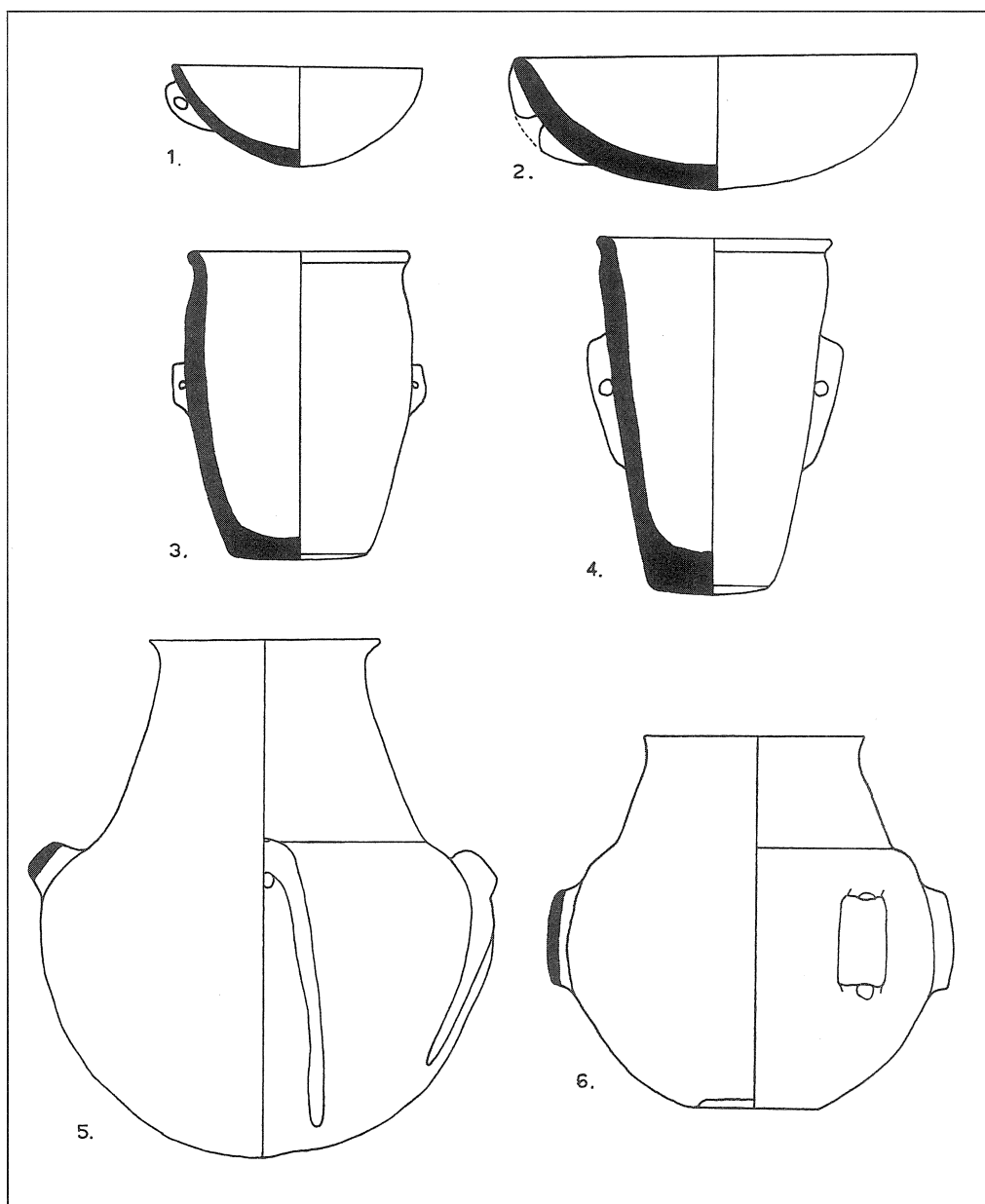


FIG. 10.4 Comparison of shapes from lasos (*left*) and Grotta-Pelos graves (*right*); Nos. 1 to 4 are of marble. Scale c. 2 : 5.

of the Pyrgos cave in Crete (pl. 5, 6) are related. They probably fall within the Early Minoan I period.

Anatolian relations are more numerous, quite apart from the Grotta bowls already discussed. A suspension pot of Cycladic appearance was found by Heidenreich (1936, pl. 36, 1) at Tigani in Samos. At Thermi a bottle of Cycladic type was found (Lamb 1936a,



FIG. 10.5 Distribution in the Aegean of marble beakers (rhyta) of Cycladic type. Circles denote findspots of those with flat bases, squares of those with pointed bases.

1, Phylakopi; 2, Leivadi; 3, Krassades; 4, Panaghia; 5, Paros, uncertain location; 6, south-east Naxos, uncertain location; 7, Ios, uncertain location; 8, Amorgos, uncertain location; 9, Thera; 10, Tigani; 11, Iasos; 12, Aghioi Anargyroi; 13, Naxos, uncertain location; 14, Kephala.

pl. XIII, 565), and suspension pots of vaguely Cycladic appearance are common enough in the Troy I period at several sites (cf. fig. 10.4, 5). But most of the analogies based on the use of incised decoration seem highly doubtful. The technique has an independent existence of its own in Anatolia at this time and the examples quoted rarely compare closely with the Cycladic ones, which fall within a very restricted range.

The use of marble vessels is often taken as a particularly Cycladic trait, but it need not necessarily be so, for the newly discovered bowls of the Yortan culture are totally un-Cycladic. Indeed with the wealth of marble in west Anatolia it is not surprising that such an industry should flourish. A flat-based rhyton of Cycladic appearance (cf. the distribution map, fig. 10.5) was found unstratified at Tigani (Heidenreich 1936, pl. 54, 2) and it compares well with Cycladic examples (pl. 1, 4 and Tsountas 1898, pl. 10, 18).

The closest parallels yet discovered for the Grotta-Pelos culture are at Iasos (Levi 1963; 1965; 1967). There a marble rhyton (fig. 10.4, 3) and a marble bowl (fig. 10.4, 1) compare closely with Plastiras group examples, and some similarity may also be noted in the ceramic forms (fig. 10.4, 5). These vessels at Iasos were found in a cist cemetery which Levi has hailed as Cycladic type (1963a). The similarities indeed are undoubted, but so too must be the differences. There are round graves as well as rectangular ones, and the pottery assemblage contains many forms which are quite un-Cycladic. And while many of the forms there belong to the Anatolian Early Bronze 1 phase, others such as the flask with *depas*-like handles belong rather to Early Bronze 2. Unfortunately no figurines have yet been found at Iasos, and obsidian is rare.

All this is sufficient evidence to furnish a consistent relative chronology for the Grotta-Pelos culture. The Grotta bowls, as already noted have clear affinities with the latest neolithic of the mainland (Eutresis Group II) and especially with the Late Chalcolithic of west Anatolia. There are vague similarities too with the 'sub-neolithic' ware of the Eileithya Cave in Crete.

The Lakkoudhes group cemeteries, with their incised pyxides, have no parallels so convincing as those of the marble vessels of the succeeding Plastiras stage. The incised bottles equally form a link with the Troy I period at Thermi and with Early Minoan I. The suspension pots of Palaia Kokkinia constitute a rather vague link with the Eutresis culture.

It is clear therefore that the Grotta-Pelos culture originated during the Aegean final neolithic. By the Aegean Early Bronze I phase the Lakkoudhes group cemeteries are surely well established. The absence of Grotta-Pelos finds in Early Bronze 2 contexts, and the widespread contacts of the Keros-Syros culture at that time suggest that the Grotta-Pelos culture was by then declining or even defunct.

Origins of the Grotta-Pelos culture

At first sight the distribution of Kum Tepe Ib bowls in west Anatolia, the practice of cist burial there, the widespread use of schematic marble figurines, and now the Iasos links

seem to provide impressive evidence for a north-west Anatolian origin of the Grotta-Pelos culture. But of these features, only the first is chronologically convincing, and the important differences in the Cycladic and Anatolian burnished bowls has already been discussed. Their development could have been a parallel one, and although some genetic link may reasonably be postulated, it could be of far earlier date.

There are links between the Saliagos culture and Emborio X (Evans and Renfrew 1968, 83), and it is consequently not particularly surprising that we also find links between Grotta and Emborio VII. What is missing in the Cyclades is evidence of settlements that doubtless existed during the intervening periods of Emborio IX and VIII. The picture may thus be a very different one from the three phases of pre-Pelos settlement in the Cyclades suggested by French (1964, 137). His phase (c), the Kum Tepe Ib culture, is now seen as an integral part of the Grotta-Pelos culture rather than as a pre-Pelos phase of Anatolian influence. The chief evidence for his phase (a) is the pattern burnish of Kephala, which is of a different type to the Anatolian and of clearly Attic affinities. No pattern burnish ware of Beşikatepe type whatever has been found in the Cyclades. The suggested phase (b), relating to the Kum Tepe Ia culture, is inevitably of the same vague and unsatisfactory status as Kum Tepe Ia itself; it seems to consist principally in thin rim bowls (cf. fig. 5.3, 2). This generalised feature is seen much earlier at Emborio and indeed at Saliagos, whereas there is really no evidence yet for its persistence in the Cyclades after the end of the Saliagos culture. Those proposed successive phases of Anatolian influence do not thus seem very satisfactory at present.

The quantities of obsidian found in west Anatolia are so small compared with those of the mainland or Crete, even allowing for the fewer sites known, that it is difficult to envisage the frequent contact and the cultural homogeneity that a simple succession in the Cyclades of west Anatolian cultures would imply. It seems likely that, even in the Early Bronze 2 phase, there was considerable cultural autonomy, a point emphasised by the significant differences in the bowls of the Kum Tepe Ib and Grotta-Pelos cultures.

To derive the burial customs of the Cyclades from Anatolia is also difficult, although it may be that these difficulties will be overcome by the discovery of earlier cist graves than hitherto in west Anatolia. But at present the round graves at Kephala in Kea are the earliest known of that form. At Kephala, contemporary with the final neolithic of the mainland and probably with the earlier part of the Grotta-Pelos culture, cist graves are in use. The smaller of them were constructed of slabs in the same manner as the Pelos ones and those of Özgüç's Type 1 (1948, 41 and pl. 64). This is indeed the form seen in the Grotta-Pelos culture throughout its duration. It seems that the Anatolian cist graves do not precede the Early Bronze 1 period in west Anatolia (Mellaart 1962, 44) so that until predecessors are found for them in that area, we are not entitled to derive the Cycladic practice from Anatolia.

The same objections hold for the figurines. The Kusura type is in any case different from the Cycladic ones, with its narrow neck and broad head (Lamb 1936b, fig. 17.2) and is not as early. The schematic figurines of Troy and either of the Kusura type (Schmidt

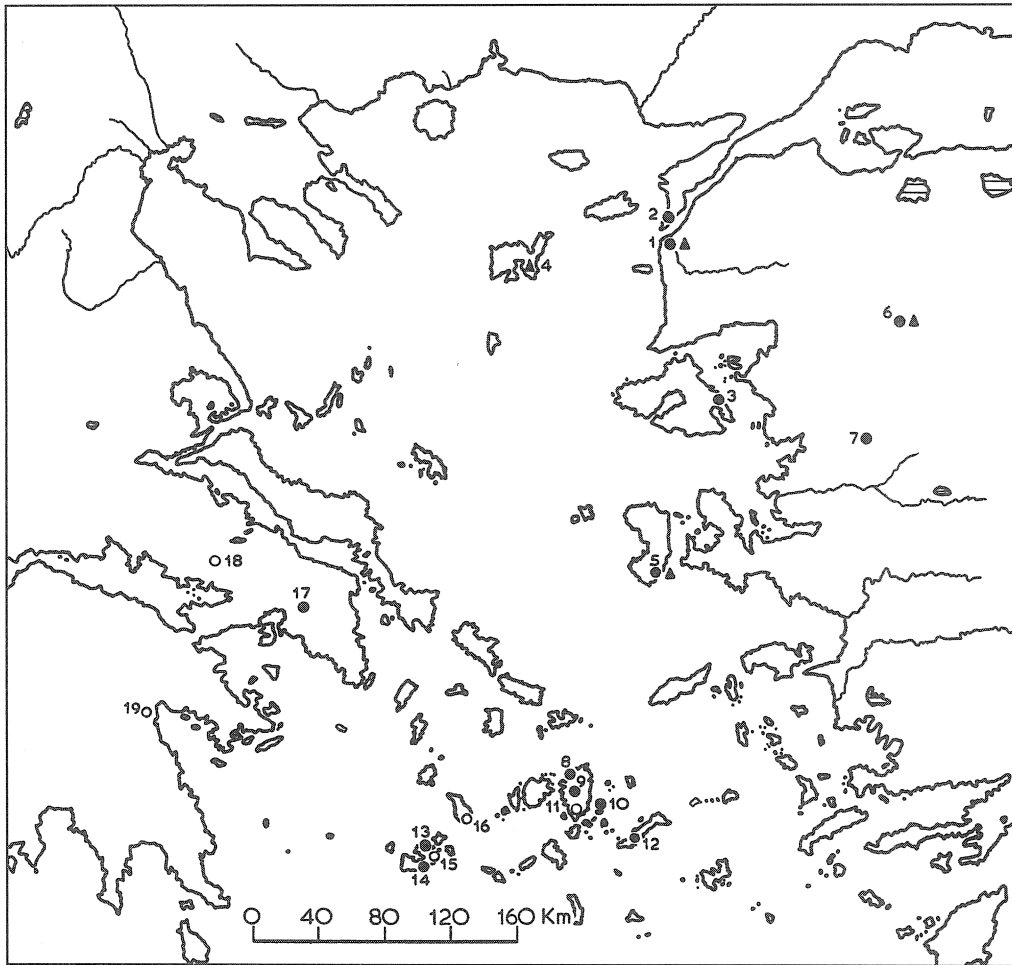


FIG. 10.6 Distribution in the Aegean of heavy burnished bowls with rolled rims of 'Kum Tepe Ib' type. Dots indicate findspots of the Grotta type; triangles those of Poliochni type; open circles, those where no horizontal lug handle is preserved (see notes to the figures for findspots).

1902, 279) or else generally of Troy type with a figure-of-eight shape (*ibid.*, 278) are not common in the Cyclades, where the neck and head are generally represented by a narrow projection from the body, and where the facial features, commonly indicated at Troy, are very rarely shown. The figurines of Troy begin in the First City and are commoner in the succeeding periods, persisting to Troy V (Blegen et al. 1950, II, 48). None was found at Kum Tepe. Equally at Beycesultan, where the general shape of the figurines (Lloyd and Mellaart 1962, fig. F.1) compares more closely with the Cycladic

ones not a single schematic figurine was found before the Early Bronze 1 period. There does not seem to be a single schematic figurine in west Anatolia which could make a suitable precursor for the Cycladic ones.

The find of a schematic marble figurine at neolithic Saliagos near Antiparos (Evans and Renfrew 1968, fig. 76 and pl. XLIII) dated by radiocarbon to around 4000 BC indicates that this form has a long ancestry in the Cyclades, and indeed suggests a local continuity. A comparison of the ceramic forms of the Saliagos and Grotta-Pelos cultures does not furnish much supporting evidence for such continuity, but this may be due to their considerable difference in date and to the absence of intermediate finds. But this early schematic figurine does give evidence, which was entirely lacking until 1965, that a local precursor is possible for a very characteristic Grotta-Pelos form. Similarly the marble vessel shapes of Iasos, which closely resemble Cycladic ones, are a unique find in west Anatolia while they are very much at home in the islands. The date at Iasos is not a very early one, and certainly the pointed rhyton from Kephala is anterior to the Iasos vessels.

A strong case might thus be made out for deriving the entire west Anatolian burial assemblage including round and rectangular cists, pithoi, marble vessels and schematic figurines from the earlier Cycladic example, especially from the cemetery at Kephala. But although this is very possible it seems preferable to seek in Anatolia precursors for the Anatolian graves, just as in the Cyclades links between Saliagos and the Grotta-Pelos culture with its rolled rim bowls may be suspected. Parallel evolution in the two regions, doubtless with occasional contact, would then be a sufficient explanation for the similarities observed between them.

The Keros-Syros Culture

The evidence which has been accumulating in recent years for the existence of this culture in other islands than Syros is important in several ways. Most of all perhaps it demonstrates that the Grotta-Pelos and Keros-Syros cultures are chronologically distinct, and not mere complementary regional distributions. In the following account it is this aspect which will be brought out, for a thorough discussion of the Syros material must await Fischer-Bossert's full publication of Tsountas's finds, and will be most authoritatively presented by her. It is not therefore proposed to discuss every type in turn here, but simply to choose those that seem to have a wider significance. Fortunately Tsountas published several complete grave associations, and from their homogeneity the contemporaneity of the main types may be deduced.

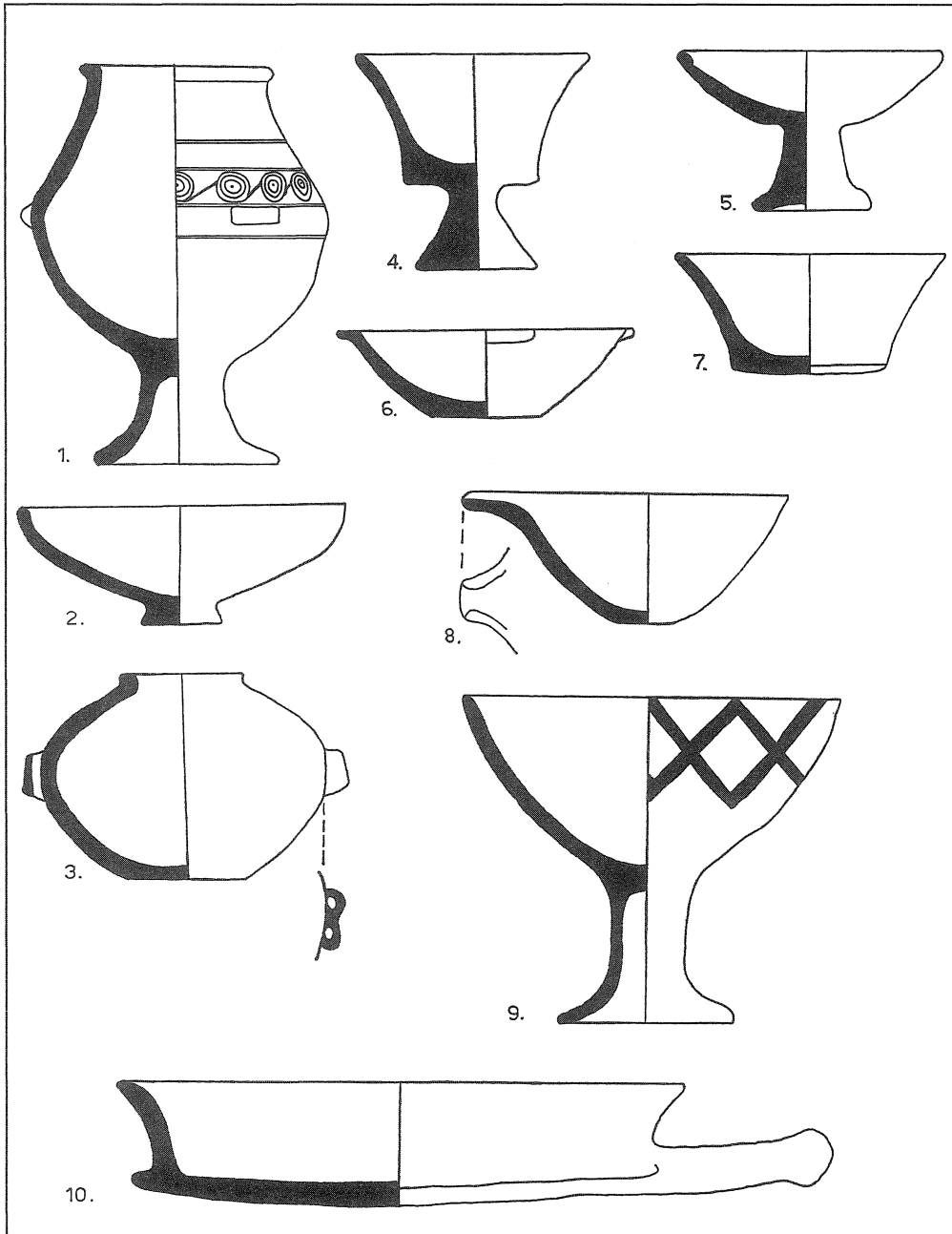


FIG. 11.1 Forms of the Keros-Syros culture from Chalandriani. No. 9 has dark-on-light painted decoration, 4 to 8 are of marble. Scale 2 : 5.

It is perhaps worthwhile first to define more clearly the Keros-Syros culture in contrast with the Grotta-Pelos culture. As explained in Chapter 9 the division rests in the first instance on the grouping of grave finds. Whereas the Grotta-Pelos tombs contain cylindrical and spherical pyxides, necked jars often on pedestals, herring-bone decoration and such marble types as the *kandila*, the flat-based rhyton and the schematic figurine, the Keros-Syros culture has none of these things. The pyxides are lentoid rather than cylindrical, the footed jars are different, and there is a complete new repertoire which is entirely characteristic (figs. 11.1 and 11.2). The fabric is itself recognisable: the red-brown surface has a lustre which arises not merely from the application of an *Urfirnis* coating, as some have thought, but from a combination of slip and burnish. It is rather different from the burnished surface of the finest Pelos pots, but there are sometimes confusions between it and the later early bronze age burnished wares of Phylakopi I type. The stamped spiral (more often in fact concentric circles) and the painted wares are a new feature now. But to take any single technique as diagnostic would be a mistake, as is seen below for the stamped decoration. There is also a range of new forms in marble. Most prominent among them is the folded-arm figurine, which in view of its importance chronologically and for recognising the culture, will be separately discussed.

Internal variation

The starting point for any discussion of the Keros-Syros culture must be the abundant finds from the cemeteries at Chalandriani itself. These, as will be seen, form a fairly homogeneous group, which has close parallels in the finds from Naxos and Siphnos. On the other hand, the finds from Amorgos, while sufficiently close to be classed within the Keros-Syros culture, include also several rather late features (such as the Phylakopi I duck vase) suggesting that cist burial may have continued there until the end of the early bronze age, and indeed into the middle bronze age period. This material constitutes the Amorgos group of the Keros-Syros culture (pl. 9, 5–6).

At Chalandriani itself, the recent finds from Kastri, the fortified stronghold there, show features not observed in the cemeteries excavated by Tsountas. Since they evidently date from the last period of use of the fortress they may plausibly be set at the end of the occupation which the cemetery finds document: this late position is supported by the eastern Aegean analogies for the finds. This assemblage of material may be termed the Kastri group (pl. 9, 1–4).

These groups are discussed in greater detail in Appendix 2. The great bulk of the finds of the Keros-Syros culture, however, are from the cemeteries of Syros and Naxos, together with the objects from Dhaskalio in Keros. The notable homogeneity of the cemeteries at Chalandriani in Syros is indicated in table Appx. 2.1. Painted pottery (fig. 11.1, 9; pl. 7, 2–5), ‘frying pans’ of Syros type (fig. 11.1, 10; pl. 7, 1), ‘sauceboats’, folded-arm figurines, marble and metal objects, are found associated together in such a way that no

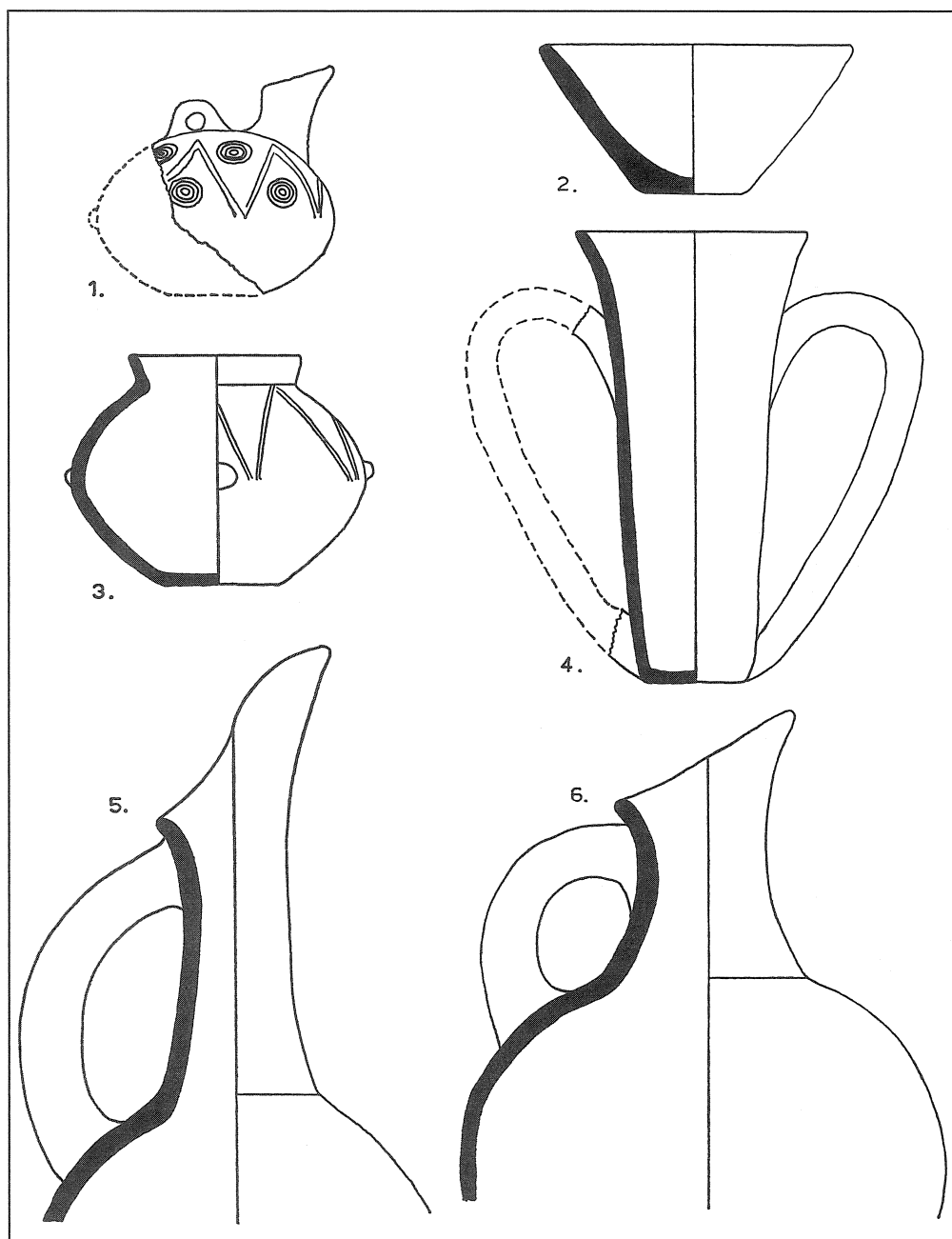


FIG. 11.2 Forms of the Kastro group of the Keros-Syros culture, from Kastro near Chalandriani on Syros (*drawings after originals by Bossert*). Scale 2 : 5.

internal grouping can be discovered. Thus, while the Kastri and Amorgos groups may be late in the duration of the Keros-Syros culture, in the Early Bronze 3 period of the Aegean, the bulk of the cemetery finds form a homogeneous assemblage principally of Early Bronze 2 date.

The folded-arm figurine (figs. 19.5 and 19.6) deserves special mention here in view of its chronological importance. Some seventeen examples have been found in the Cyclades with well associated material (generally in the same grave) which can independently be dated. In every case, and without exception, the associations are of the Keros-Syros culture (Renfrew 1969a, 11 f.) The associations in the Spedos cemetery in Naxos (Graves 10 and 12; Papathanasopoulos 1961–2, pl. 46 and 53), at Chalandriani in Syros (Graves 307, 345 and 447; Tsountas 1899, 111), and at Dokathismata in Amorgos (Graves 13 and 14; Tsountas 1898, 154), are especially significant.

In addition there are eight folded-arm figurines from Chalandriani in Syros whose associations are not recorded, but which, in view of the other finds there, are clearly of the Keros-Syros culture. The same holds true for the numerous fragments and the single complete example from Dhaskalio in Keros (Zapheirou 1968b, 97).

In all the cases in Syros and Naxos, where the associations are preserved, they are of normal Keros-Syros type, and not referable to the Kastri group of that culture. Some of those in Amorgos must be associated with the Amorgos group, and it seems likely that they were manufactured in the Early Bronze 3 period as well as in Early Bronze 2.

Mention should be made also of the finds at Aghia Irini in Kea and at Phylakopi in Melos (Renfrew 1969a, 24), where the figurines are not, however, well stratified. This occurrence on Melos, and also on Antiparos and Ios, is of interest since other finds of the culture are not recorded from these islands. Perhaps further finds remain to be made there, or alternatively, the folded-arm figurines of Melos may be imports like those found in mainland Greece.

The folded-arm figurine type has been divided into several distinct varieties (Renfrew 1969a, 15 f.), whose artistic and social implications will be considered later. They are illustrated in figs. 19.5 and 19.6 and pls. 30–32, and the distribution in Crete and the Cyclades shown on fig. 19.7 (mainland finds on fig. 20.5). The Kapsala variety, with its rounded form, the Dokathismata variety with its stylish elongation and the squat Chalandriani variety are particularly well defined. The Spedos variety is something of a residual category, with greater range in shape. Here it is important to note that the flat Koumasa variety is restricted entirely to Crete and was almost certainly manufactured there. Seventeen examples of this variety are known from Crete as against twelve entire or fragmentary examples of other varieties of the folded-arm type, which were presumably imported. The Cretan examples are probably all from Early Minoan II or Early Minoan III contexts, although the precise associations are not always clear. About fourteen folded-arm figurines are known from southern Greece, all probably imports. None is documented from western Anatolia, although Bent (1888, 82) wrote of a find at Kap Krio near Knidos.

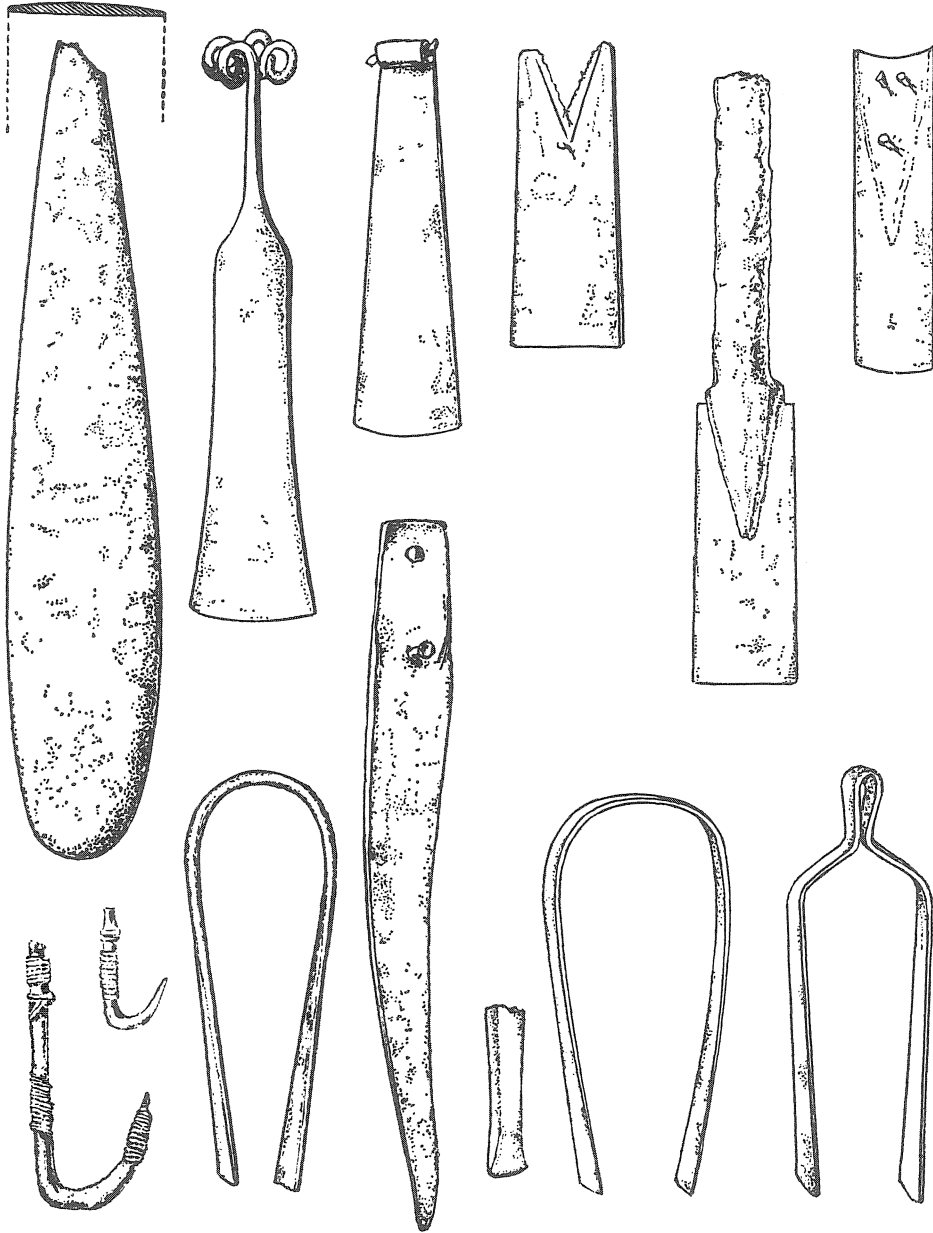


FIG. 11.3 Metal types from the Chalandriani cemetery on Syros (after Tsountas).
Scale 2:3.

These beautiful and remarkable objects will be considered again in a later chapter. For the moment it is sufficient to appreciate their integral position in the material assemblage of the Keros-Syros culture. Although these figurines have at times been viewed as products of the Early Cycladic cultures in general, they can in fact be recognised as one of the typical and diagnostic forms of the Keros-Syros culture, achieving a wide distribution in the southern and western Aegean (fig. 20.5).

The settlements

The foregoing discussion of the variations within the material goods of the culture has touched already on many of the principal sites. To the present time only four settlements have been substantially excavated, although several more are known. Their locations are given in the Gazetteer.

Chalandriani in Syros is best known from the extensive cemeteries excavated by Tsountas (1899). He also investigated the small fort at Kastri which has been reexcavated by Fischer-Bossert (1967). Kastri itself is at the summit of a small hill rising steeply from the sea to a height of nearly 170 m (fig. 14.15 and pl. 14, 1). To the south, east and west there are steep-sided ravines, and a fortification wall defends the small stronghold from attack from the seaward side to the north. The cemeteries lie some way to the south, on the other side of the ravine. And the principal settlement may have been to the west of these, as Tsountas suggested. Kastri would then be a stronghold and place of refuge rather than the principal and permanent settlement. Certainly sherds have been found in this area, which lies about one kilometre to the south-west of Kastri. In 1963 I was handed several sherds (now in the Syros museum) which had been found there by a farmer: they included a 'sauceboat' spout and part of one of the incised pyxides discussed in Appendix 2 (cf. fig. 11.2, 3). Excavation would be needed to determine whether or not there was a major settlement—perhaps even a town, as Tsountas suggested—at this spot.

Kastri at Chalandriani ranks as a major fortified site in the Cyclades, although it is less than 50 m in width (pl. 21, 1; fig. 11.4). The lower courses of the wall and parts of six semi-circular bastions are preserved. There are traces also of what may have been a second circuit wall four or five metres outside the first. But its significance is not clear. Entrance was through one of the towers, and there are two further apertures in the wall. All the walling at Chalandriani is of the drystone type: large blocks, like those seen in the fortifications at Phylakopi II (pl. 21, 3), were not used.

The interior plan is clear, consisting of small aggregates of rooms, generally only two or three metres in diameter, and separated by narrow paths or 'streets'. In shape they are irregular, neither strictly rectilinear nor curvilinear. Hearths were found in three of these rooms, and in one of these, in Room 11, bronze slag was found in the ashes together with part of a crucible (Bossert 1967, fig. 3.5) and the important hoard of metal objects described in chapter 16. Further crucible fragments and stone moulds were also

found on the site, as well as lumps of lead, together with other evidence of lead working. The pottery found at Kastri is discussed in Appendix 2. Other finds include two short daggers and a slotted spearhead.

A little fort found near Panormos in south-east Naxos is in some ways rather similar (Doumas 1964, 411). Situated at the summit of a low hill, Korphari ton Amygdalon, overlooking the bay of Panormos, is again accompanied by a cemetery. It may be simply the fortified stronghold of a larger settlement which Doumas, the excavator, believes lies nearby.

The fort is only 25 m long (fig. 11.4; pl. 21, 2) and consists of an enclosing wall with several irregular, roughly semicircular bastions. Entrance was by a gateway on the east

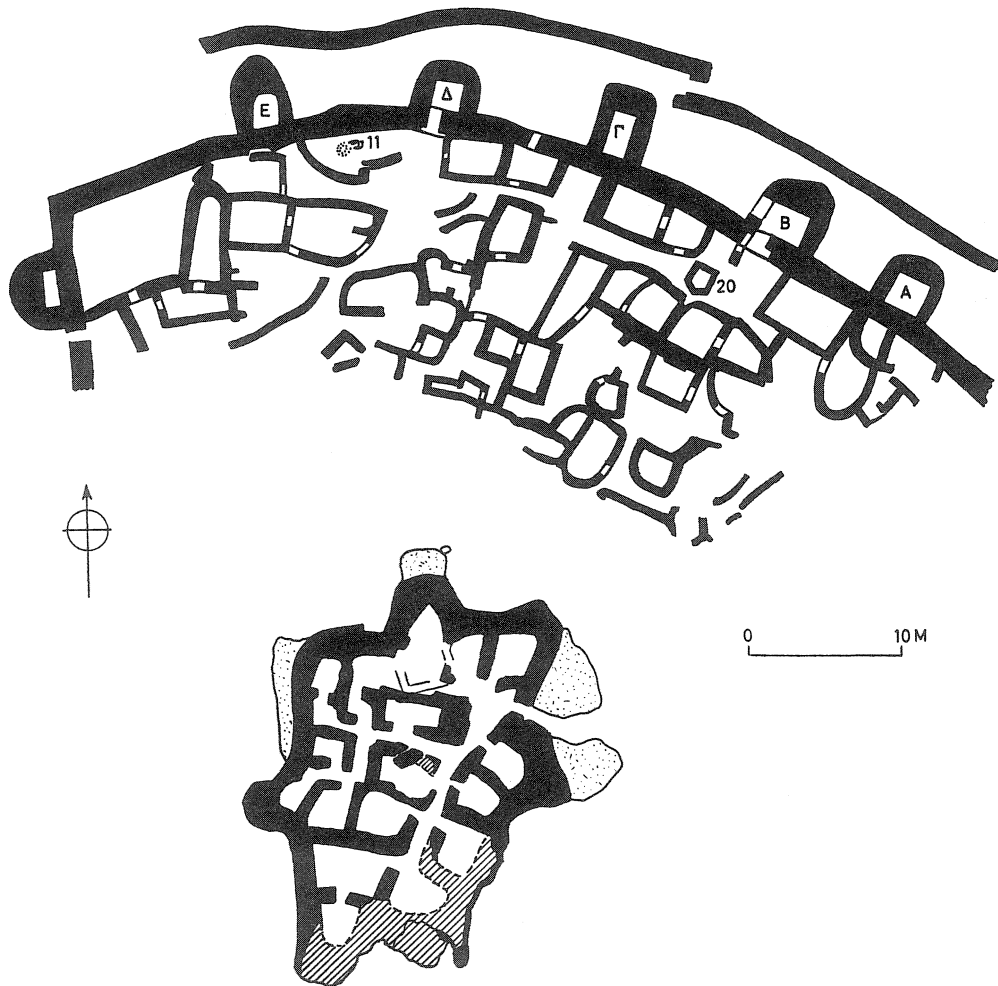


FIG. 11.4 Fortified strongholds of the Keros-Syros culture: Kastri near Chalandriani on Syros (above); Panormos on Naxos (below).

side, outside of which a large heap of uniform-sized circular stones was found. These have been plausibly identified as sling stones for the use of the defenders. The rather limited space within is completely taken up by more than a dozen little rooms, each only a couple of metres wide, linked by narrow passageways. The finds were few, but place the settlement in the Keros-Syros culture. The most important was a spearhead with bent tang, but without slots (cf. Stronach 1957, fig. 4.1). Part of a marble bowl with four horizontal ledge lugs at the rim, a typical Keros-Syros type, was found on the surface (cf. Bossert 1967, fig. 5.4).

South-east of Panormos lie the Kouphonisia and the small island of Keros. The third excavated settlement of the culture is situated on a tiny islet, really little more than a rock, just off the west coast of Keros: Dhaskalio. It may well have been linked to Keros by a neck of land in the third millennium BC. On top of this islet were found the foundations of a rectangular building, presumably a house (Doumas 1964, 410). The rich but fragmentary finds from what was probably a disturbed cemetery were made on Keros immediately facing Dhaskalio.

The fourth site, which has been unjustly neglected in some accounts, is at the summit of the Kynthos on the island of Delos (Plassart 1928, pl. III). Once again it is a hilltop settlement in a fine defensive position, at the summit of a rather steep hill, some 100 m high, overlooking a safe harbour, and with magnificent views in all directions. It may well have been fortified, but this is not clear since the site was much disturbed by Hellenistic constructions of the third century BC. The preserved walls resemble those of Chalandriani and Panormos, with closely juxtaposed, small rooms of irregular shape.

The finds include fragments of 'sauceboats' and of footed jars of typical Syros form. There are also part of incised spherical pyxides, and very lustrous, black, one-handled cups which are hallmarks of the Kastri group. The site is interesting also for the stone grinders and various objects of stone and clay for domestic use. Such finds seem to have been lacking at Kastri and Panormos, confirming their status as places of refuge.

Finally mention should be made of the interesting site at Korphi t'Aroniou in south-east Naxos. The dating evidence for this small site is not rich, but probably it falls within the time span of the Keros-Syros culture. Its great importance lies in the carved stones found there, worked by a pecking technique, which show scenes of uncertain interpretation, including apparently dancing and perhaps ploughing (Doumas 1965). Other carved stones are known from south-east Naxos (pl. 26, 1; Bardanis 1966).

The cemeteries

In the central Cyclades, especially Naxos and Siphnos, many of the Grotta-Pelos cemeteries continued in use, with little change in the burial custom.

The size of the cemeteries did increase. For instance Stephanos excavated 170 graves at Aphenдика (although it is not excluded that some may have been of Grotta-Pelos date), while Phyrros had 120 and Karvounolakkoi 82 (including both Keros-Syros

and Grotta-Pelos graves), without counting graves more recently opened. As we shall see, the Chalandriani cemetery contained more than 500. The Keros-Syros graves in Amorgos are very similar, although they seem to lie in much smaller groups, 20 graves reported at both Kapros and Dokathismata being the largest number recorded.

The burial customs, apart from the change in grave goods, apparently continued with little alteration. Double graves are still found in Siphnos at this time. Cist grave cemeteries of this kind are known from Naxos, Siphnos, Amorgos, Keros and the neighbouring isles, Thera (apparently) and Ios (probably), and there are Keros-Syros finds from Dhespotikon and Antiparos, which may have come from graves of this kind. Of the islands with Grotta-Pelos cist cemeteries, only Paros and Melos apparently lack burials of the Keros-Syros culture.

The cemetery at Chalandriani is different from these. It lay in two distinct areas: Tsountas excavated 50 graves in the western one, estimating those previously opened at about 100. The graves lay clustered in small groups. The eastern area contained four clusters of respectively 108, 242, 65 and 75 graves, giving a total of 490. At Aghios Loukas on Syros the cemetery comprised 94 graves.

Tsountas classed the graves as rectangular or circular (although some were intermediate). All were constructed entirely of drystone walling, unlike the cist graves just discussed which were built of upright slabs. The chamber was about 1.5 m wide, and each had a false entrance, closed with rough stones. Since each contained only a single burial (in only 10 cases were two or more burials found) this entrance had no obvious function. The drystone walls were surmounted by a slab in *tholos* fashion (cf. pl. 25, 2).

Tombs of similar form have been found at Lionas in Naxos (Doumas 1963, 279); and at Akrotiraki in Siphnos the graves were built of small stones, but without an entrance. The grave at Dhiakophtis on Mykonos may also have been of Syros type.

In each small group at Chalandriani the graves were predominantly circular or quadrangular, as shown in table 11.1.

TABLE 11.1 Grave types at Aghios Loukas and Chalandriani.

Group		Circular	Rectangular	Uncertain	Total
A. Loukas		11	65	18	94
Chalandriani,	West	12	22	16	50
	East				
	gp. 3	5	55	5	65
	gp. 2	143	79	20	242
	gp. 4	44	4	27	75
	gp. 1	c. 40	c. 40	?	108

The knees of the dead man were drawn up to the waist, and he was laid on one side, generally on the left. The grave goods were placed at the head or at the feet.

In general the graves were poor. The commonest grave object was the small and simple pottery bowl (Type 40) of which examples were found in 224 graves; 129 simple

cups were found in 121 graves. Other objects were less frequent, so that many of the graves seem to have been entirely without grave goods. The contents of the 32 richest graves were listed by Tsountas and are summarised in table Appendix 2.1 (cf. p. XXX).

The burial practices of the Keros-Syros culture in general closely resemble those of the Grotta-Pelos culture, although the cemeteries were larger. Within the Keros-Syros culture, however, the graves of Syros (together with Lionas etc.) must be singled out for their drystone construction and distinctive shape. They differ from the Grotta-Pelos graves in containing a single burial, with exceedingly few exceptions. These graves find precursors, as concerns the drystone walling, in the round and rectangular graves of Kephala in Kea, although these were without entrances except for one possible occurrence. And the Kephala graves generally contained several burials.

The Keros-Syros culture and the Early Bronze 2 continuum in the Aegean

The affinities of the Keros-Syros culture are so numerous at this time, and the evidence for Aegean contacts so abundant that rather than listing the various forms of the culture individually it may be permissible to present the overall picture directly.

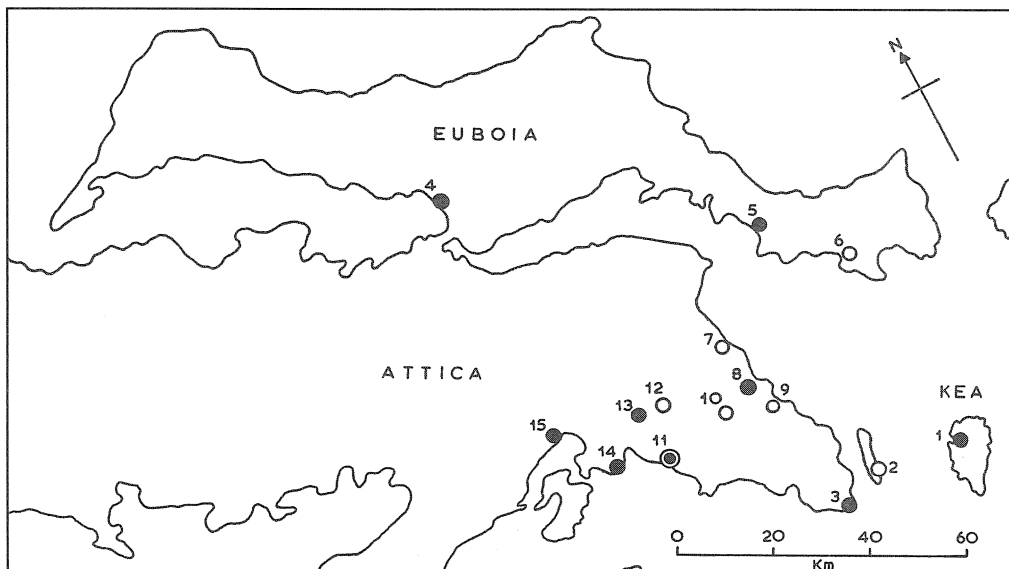


FIG. 11.5 The Attic-Cycladic *Mischkultur*: finds of Cycladic type in Euboea and Attica. Dots represent findspots of folded-arm figurines, circles indicate cist graves containing other marble forms.

1, Aghia Irini; 2, Makronisi; 3, Sounion; 4, Manika; 5, Styra; 6, Makrykapa; 7, Raphina; 8, Brauron; 9, Porto Rapti; 10, Markopoulos; 11, Aghios Kosmas; 12, Chalandri; 13, Athens; 14, Piraeus; 15, Eleusis.

The chronological position of the culture is well attested. In Crete all its affinities are with Early Minoan II, as will be argued in chapter 13. On the mainland they are entirely with the Korakou culture, for the stamped wares of the Eutresis culture, although curiously similar, do not fall within the range of Keros-Syros types. And the late Kastri Group of the Keros-Syros culture has close affinities with the Lefkandi assemblage of the mainland, which succeeds the Korakou culture and precedes (or runs contemporary with) the Tiryns culture. The relations between the Cyclades and mainland Greece in the third millennium BC are further discussed in Appendix 2 in the section on the Attic-Cycladic *Mischkultur*. The patterned wares of the Lerna culture, so abundant in

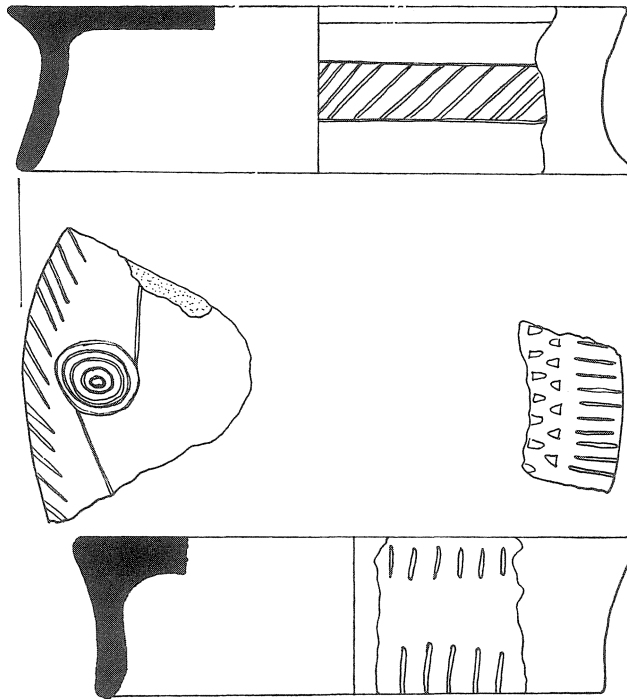


FIG. 11.6 The mainland 'frying pan'. (Above) lid from Lerna III (L.1448); (below) lid or pan from Corinth (I.B1). Scale 1 : 2.

Lerna IV, have little in common with the Keros-Syros ones which are to be equated rather with Lerna III (Caskey 1960a). In west Anatolia the most numerous affinities of the Keros-Syros culture are with Troy II: the triple spouted sauceboat of Syros (Zervos 1957, pl. 185) may be compared with the two spouted version of gold from Treasure A at Troy (Schmidt 1902, 5863), and the double-spiral-headed pins form another link between Troy and the other Aegean cultures (fig. 11.3 and fig. 16.7). Aegean contacts, in the form of Korakou or Keros-Syros 'sauceboat' fragments begin in Troy I, however (Blegen et al. 1950, 154), so that Troy II may begin later than these cultures. Equally some of the

forms seen in the Cyclades and the mainland such as the one-handled cup (form A33 and 39 at Troy) and the *depas* (form A45) continue until phase V there. The *Urfirnis depas* is limited at Troy to phases II and III (Blegen et al. 1950, 252) but as discussed in Appendix 2, the Kastri group has explicit parallels with Troy III and IV. It is probably



FIG. 11.7 Findspots of 'frying pans' and pottery decorated with stamped circles, in the Cyclades and south Greece.

Upright triangles denote findspots of 'frying pans' of Kampos type; squares, those of Syros type; circles, those of mainland type; inverted triangles, other 'frying pans'; crosses, findspots of other sherds decorated with stamped circles.

1, Kampos; 2, Grotta; 3, Kato Akrotiri; 4, 'Sikinos'; 5, Manika; 6, Chalandriani; 7, Dhiakophtis; 8, south-east Naxos; 9, Akrotiraki (doubtful); 10, Raphina; 11, 'Andros'; 12, Aghios Kosmas; 13, Palaia Kokkinia; 14, Aegina; 15, Corinth; 16, Lerna; 17, Phylakopi; 18, Pyrgos; 19, Eutresis; 20, Athens; 21, Askitario; 22, Korakou; 23, Zygyouries; 24, Asine; 25, Asea.

safe enough to equate the Keros-Syros culture with late Troy I, Troy II and perhaps early Troy III (while allowing the Kastri and Amorgos Groups to last into the Troy IV period). When referring to the time when all these cultures were flourishing, it is convenient to speak of the Early Bronze 2 period. But since Troy II, Early Minoan II, and the Korakou and Keros-Syros cultures are certainly not coterminous, this convenient term should not be given too precise a meaning.

The number of cultural links seen at this time in the Aegean is quite remarkable. The one-handed cup, for example (fig. 20.4), suddenly becomes a widespread form, where previously links of this kind between any two local regions in the Aegean were unusual, and between all of them totally unknown. Nor does anyone region dominate the others to a preponderant extent. Certainly a high proportion of the forms, such as the *depas* (fig. 11.2, 4), are of Anatolian origin, but the 'sauceboat', usually considered a Helladic type, has an equally wide distribution. And the Cycladic folded-arm figurine is widely found in the mainland as well as in Crete which otherwise seems to hold rather aloof from the Aegean world during the early bronze age.

It is this international flavour, a widespread distribution of forms with different origins, which leads one to think of a continuum rather than of cultural influence emanating from a single source. The explanation of this sudden burst of trading activity must surely lie in the new demand for metal, and in its satisfaction. It is only now in each of these regions that metallurgy takes on any importance, and indeed there is little enough evidence that it was practised at all in the preceding Early Bronze I period, except at Troy. This question is discussed again in chapter 20.

The origins of the Keros-Syros culture

The Keros-Syros culture cannot usefully be regarded as the product of some foreign inroad. Certainly many of the forms are Anatolian, but, as seen in the last section, the movement is not all one way. Indeed even among the metal forms some may be of local origin: the knot-headed pin perhaps (Tsountas 1899, p1. 10, 18 and 21), the tangless slotted spearhead (Stronach 1957, 103) and even the tweezers so frequent in Syros (fig. 11.3) and seen in Manika, Aghios Kosmas, Zygouries and in Crete are later in date in the Near East than in the Aegean (Deshayes 1960, 163). Yet while a direct Anatolian 'origin' cannot be countenanced—as it may be for the Kastri Group, for the Manika tombs, and for the Lefkandi assemblage—there must have been very considerable west Anatolian influence.

Of the many striking features possessed by the Keros-Syros culture, some may be linked with the mainland. The construction of fortifications with round bastions at Chalandriani and Panormos, not seen at Troy or Poliochni, finds a very close parallel at Lerna III. And, as mentioned in chapter 7, the use of stamped circles and spirals is attested on the mainland in earlier contexts than any yet known in Syros (cf. Fig. 11.6 and 11.7).

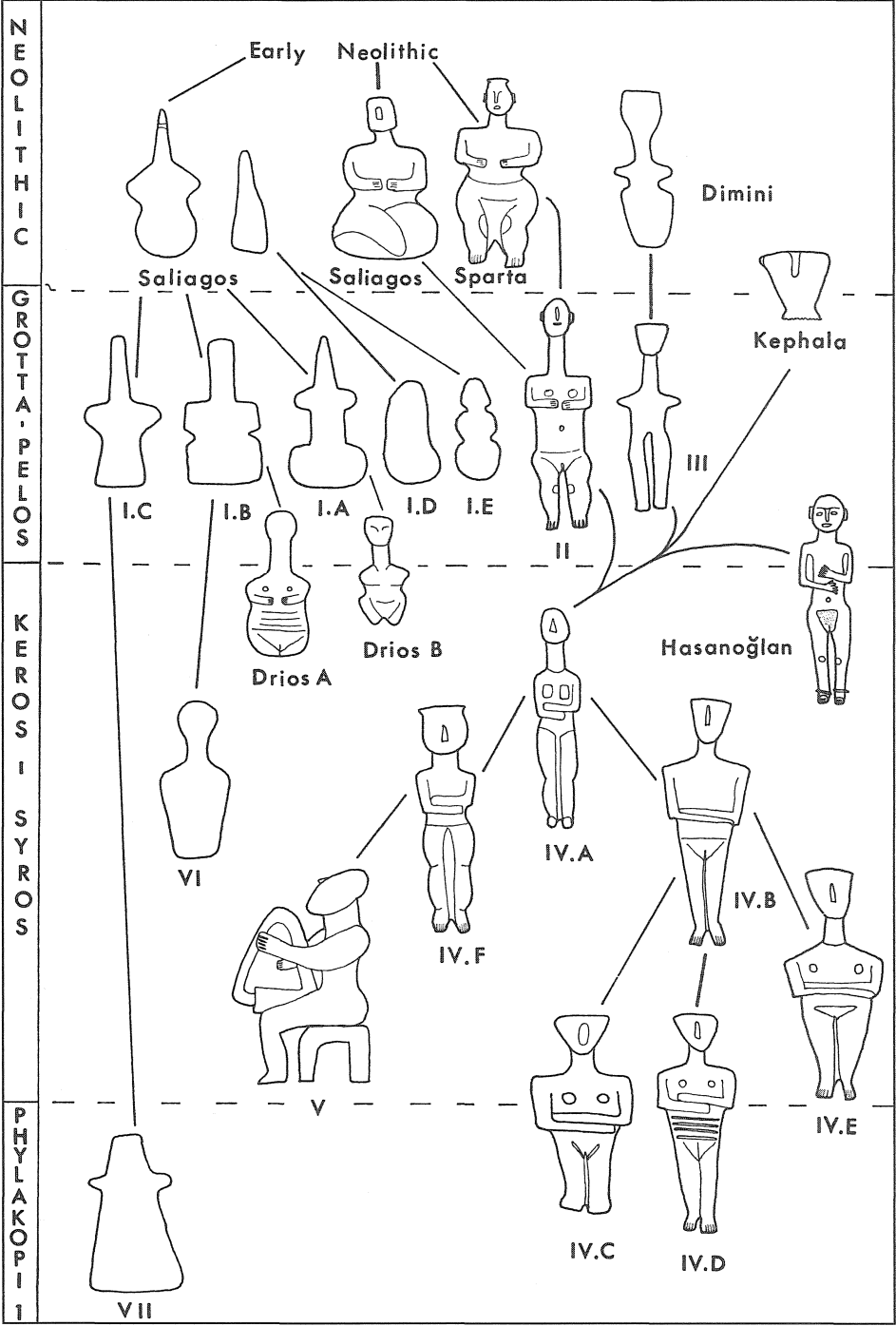


FIG. 11.8 The evolutionary development of the Early Cycladic figurines.

The precursors of the Keros-Syros culture remain vague. It seems to owe surprisingly little to the Grotta-Pelos culture, although the footed vessels (pl. 8, 10–11) could be a development of the Pelos form (pl. 3, 5), and the marble dish with rolled rim of Syros must surely originate in the Grotta bowls. The tomb form, however, is really very close to that of Kephala, which is very much earlier. Now there can be no question of the remarkable cultural unity of the Chalandriani graves and their contents springing fully-fledged into the world, and one is led to suggest the existence of an earlier and as yet undocumented phase of the Keros-Syros culture.

This hypothesis, *propter necessitatem*, not only allows for a continuity in the construction of built tombs like those of Kephala, but gets over the considerable chronological difficulty presented by the mainland stamped wares. These certainly occur in the Eutresis culture, and either we must derive the Syros ones from them, which seems odd, or admit the existence in the Cyclades of a prototype for the Syros decorated wares, to which the mainland ones could be related.

This would conveniently allow for a development of the folded-arm figurine of marble from the prototype in clay seen in the Attic-Kephala culture, and indeed for the repertoire of stone vessels. Whether the patterned ware and the 'sauceboat' have an ultimately Cycladic or Helladic origin remains to be seen. But the presence of a little painted cup resembling those of the Cyclades in the Pyrgos burial deposit in Crete (Xanthoudides 1918, 145, fig. 6.22) and the wider range of painted 'sauceboats' seen in Keros than anywhere else in the Aegean, taken together with the footed marble sauceboats known from the Cyclades, at least suggest that the former is a possibility.

But whatever the ultimate origins of the various forms and traits which constitute the culture, there can be no doubt that its great wealth and variety was due in large measure to the same underlying causes as produced the House of the Tiles at Lerna or the magnificent treasures of Troy and Alaca Hüyük.

Chapter 12

The Phylakopi I Culture

Phylakopi is the only place in the Cyclades where large areas of a settlement dating from the early bronze age have been cleared. In the light of Mackenzie's Daybooks there can be no doubt that extensive remains of the First City ('Phylakopi I') were stratified below the Second City ('Phylakopi II'). The Second City was a fortified town of middle bronze age date, as is clearly shown by the imports of Kamares and Minyan ware and the export of its characteristic curvilinear style pottery to MM Ib Knossos, Lerna V and elsewhere.

The architectural remains (Atkinson in Atkinson et al., 1904, 35 f.) are of a rather similar nature to those of the Second City (*ibid.* pl. 1). Phylakopi is indeed the only Early Cycladic site which can reasonably claim to be regarded as a town. The area of settlement was similar to that of the better preserved Second and Third towns (fig. 12.3), with a length of about 180 m. There was apparently no fortification wall at this time, but the plan of one house suggests that already the houses were packed together in compact blocks, divided by narrow streets as in the second settlement, and indeed in much the same way as a modern Cycladic village of traditional form such as Kastri on Siphnos. The straight walls, right-angle corners, and consistency of orientation contrast markedly with the informal plan of Keros-Syros settlements such as Kynthos or Kastri on Syros. It seems likely indeed that there was some planning in the town layout, and that Phylakopi, as well as being the largest of the Early Cycladic settlements, was the most rationally organised.

The wall at this site is of Phylakopi II date (pl. 21, 3). Indeed while the defences of Chalandriani (pl. 21, 1) and Panormos (pl. 21, 2) with their round bastions are certainly Early Cycladic, walls with larger squared stones and sometimes rectangular towers are a middle bronze age feature in the Cyclades. This is true both for Phylakopi and Akroterion Ourion in Tenos. The great defences at Aghios Andreas in Siphnos have never been adequately dated, and may be much later.

The fortifications at Aegina likewise (fig. 18.11, 4) may well be of middle bronze age date, for although dated by Welter to the Early Helladic period, no stratigraphical evidence has been produced for this or indeed any of his ill-recorded excavations.

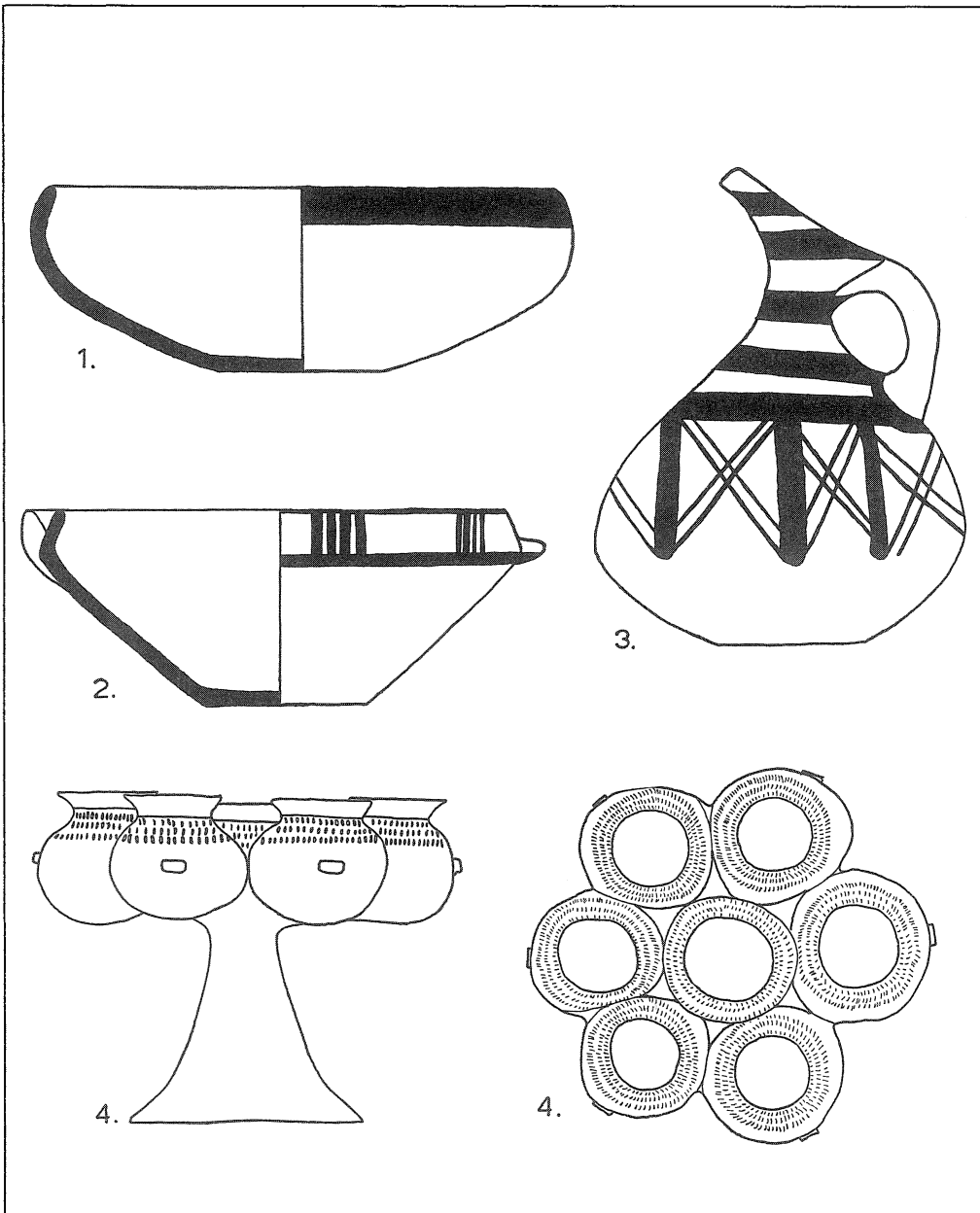


FIG. 12.1 Forms of the Phylakopi I culture, nos. 1 to 3 with dark-on-light painted decoration. Scale 2 : 5.

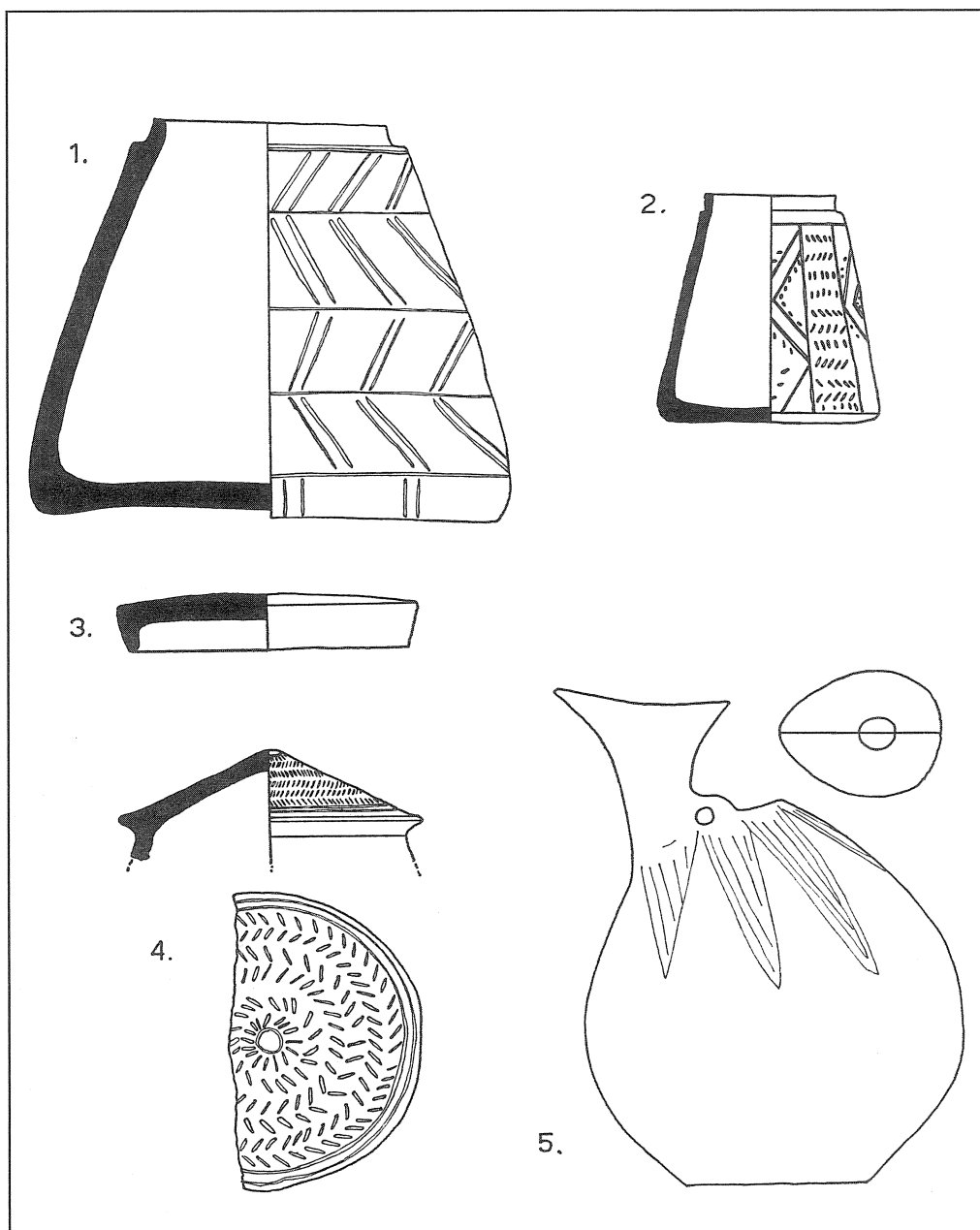


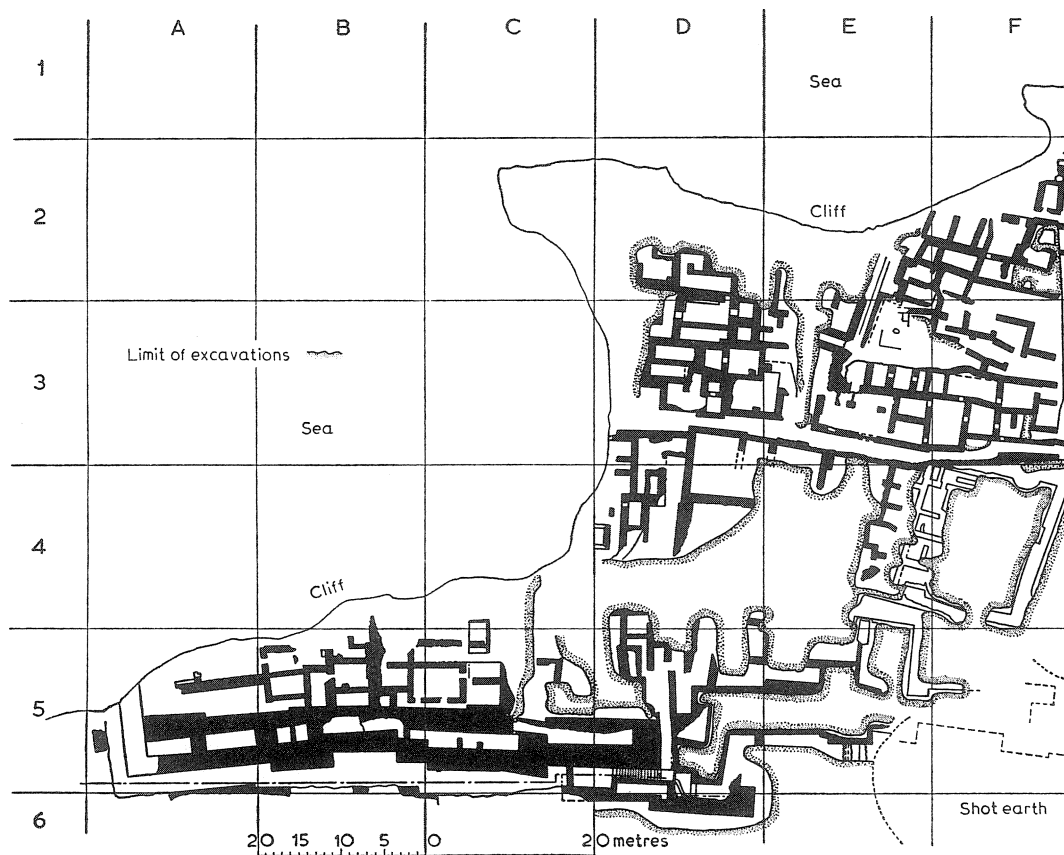
FIG. 12.2 Incised pottery forms of the Phylakopi I culture. Scale 2 : 5.

Numerous closed finds of pottery were recorded by Mackenzie and this allows us to reconstruct the typical ceramic assemblage of Phylakopi I. In the incised wares the most prominent shapes were the conical pyxis (fig. 12.2, 1) with a variety of lids (fig. 12.2, 3 and 4; pl. 10, 5), and the duck vase (fig. 12.2, 5 and pl. 12) which could be decorated in several schemes. A selection of incised sherds from Phylakopi, now in the National Museum in Athens, is shown in pl. 10. Other less common incised forms are seen in the Phylakopi publication (Atkinson et al. 1904, pl. iv, notably 7 and 9). At this time too were many undecorated vases with a dark and lustrous appearance produced by the application of a special slip, followed by burnishing. Their production continued well into the middle bronze age, for imitations of Minyan ware are found in this fabric (Edgar in Atkinson et al. 1904, 153). Sometimes this ware resembles the products of the Keros-Syros culture so closely that, on the grounds of fabric alone, it is exceedingly difficult to make a distinction, and there are some vessels in the National Museum whose date remains uncertain. The line between *Urfirnis*—supposedly an unburnished slip of glazed appearance—and a burnished slip seems a very hazy one.

A similar difficulty is often experienced with the lustrous painted wares and the matt ones. The paint of the Keros-Syros culture often retains some lustre, and that of the curvilinear style of middle bronze age Phylakopi II is certainly matt and chalky, but between the two is often a situation of some doubt. Edgar makes a firm distinction in the pottery with geometric designs between that with lustrous paint and that with matt (ibid., 96 and 102), and indeed when newly excavated and wet after washing the pots may have shown this lustre more clearly. It is very difficult to detect today however, and Mackenzie generally regarded all the early 'geometric' (i.e. rectilinear) decoration as a lustreless one, contrasting it with the painted wares of the late bronze age. It seems safest to judge today by shape and decoration rather than technique.

The most frequent shape among the painted wares is the Melian pouring bowl (fig. 12.1, 2) which often does not have a spout (fig. 12.1, 1). The beaked jug (fig. 12.1, 3; pl. 10, 2) is common as are the pithos (pl. 10, 1) and the one-handled cup. A striking find occasionally appearing in the settlement, and more often in the cemeteries, is the kernos (pl. 11, 1; Forsdyke 1925, 63, fig. 75). A single unpainted example is also known from Naxos (fig. 12.1, 4). Obsidian was still much used at this time, but there was disappointingly little metal found at Phylakopi, nor were figurines very common.

The extensive cemeteries of rock-cut tombs (fig. 7.6, 3–6), which are the only known graves of the culture, were not well dated in the publication. But surface collection at the Hill Cemetery and especially at the West Cemetery has produced Phylakopi I sherds including kernos and duck vase fragments and sherds painted in the 'geometric' style, as well as later wares. It can thus reliably be stated that the use of these tombs began during the Phylakopi I period and continued through much of the middle bronze age and perhaps beyond.



Other sites

The other excavated site of the Phylakopi I culture is Paroikia in Paros (Rubensohn 1917), situated likewise on a low hill overlooking the sea. The Phylakopi I pottery there is well illustrated in Rubensohn's excellent report. Examples of the incised ware from Paroikia are seen in fig. 12.2, 1 and 5. Of interest is a painted duck vase (*ibid.*, fig. 57) and the large quantity of light-on-dark painted ware (*ibid.*, 45). This is a fabric also seen at Phylakopi. Edgar believed it to be a rather later technique than the dark-on-light, and its use extended into the middle bronze age. In some cases it clearly imitated the incised motifs of Phylakopi I, but its introduction could be due to imitation of the 'Early Minoan III' white-painted ware of east Crete, if that is really earlier than the Middle Minoan period. Closer similarities are seen in some Middle Helladic pottery (Frödin and Persson 1938, 275 and fig. 191) which may well be indebted to inspiration from the Cyclades. As is generally the case with Phylakopi I sites, occupation at Paroikia continued apparently unbroken into the middle bronze age.

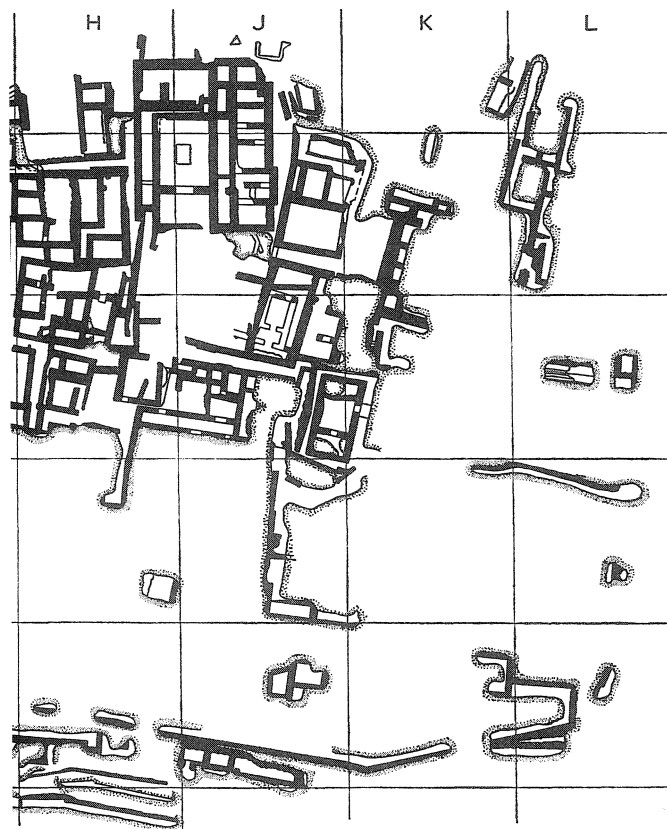


FIG. 12.3 Plan of the Third City at Phylakopi. The preserved remains of the First (early bronze age) City suggest that it was similar in size and general lay-out to the Third (late bronze age) City, although lacking the later fortification wall and the megaron 'palace'. The squares are of side 20 m (after Atkinson).

Traces of Phylakopi I occupation are scanty in Siphnos and Naxos; there are duck vase sherds and an incised conical pyxis (fig. 12.2, 2) in the Apeiranthos Museum. In Syros the only example known is a poor incised conical pyxis of late date (Tsountas 1899, pl. 9, 24). At Aghia Irini in Kea the affinities are chiefly with the mainland and the Kastri group. Nothing of the culture has been published from Mykonos or Antiparos, indeed the distribution seems to be largely a southern one (fig. Appx. 1.2), for there are finds both in Amorgos and Thera (pl. 12, 1, 2 and 6).

Relations

The Phylakopi I culture is certainly later in date than much of the Keros-Syros culture, as was seen in chapter 9, although duck vases have been found in cist graves of the rather late Amorgos group. This view is confirmed by the various parallels for the pottery in the Aegean area.

Despite the southern distribution of the culture there is no good evidence for contacts with Crete, which are so firmly established in the succeeding Phylakopi II culture. The pyxis and incised sherds from the Vat Room Deposit at Knossos which have been hailed as Cycladic imports and used to supplement the scanty evidence for the Early Minoan III period (Evans 1921–35, I, 166), are surely Early Minoan I in shape, and if incised decoration is taken to be a Cycladic feature—which hardly seems necessary in Crete—it is common enough in the earlier Grotta-Pelos culture.

It is surprising perhaps that no duck vases have been found in Crete. This form, which must be distinguished from the askos of the Korakou culture, is common enough on the mainland and in Anatolia (fig. 12.4). Fragments were found at Troy IV (Blegen et al. 1950, II, 110), and perhaps at Early Bronze 3 Beycesultan (Lloyd and Mellaart 1962, fig. P3.1). Characteristic sherds from Kalimnos were rightly separated by Furness (1956, fig. 11) from the earlier material there, a particularly fine example comes from Bozhüyük (pl. 12, 4), and several were found at the Heraion in Samos. There it is limited to Period IV (Milojčić, 1961, 65) which is equivalent to Anatolian Early Bronze 3, (Lloyd and Mellaart 1962, 231). At the Heraion such Troy II forms as the *depa*s cup (Milojčić 1961, p. 28, 7) occur only in Period III. On these grounds therefore the Phylakopi I culture can be equated with Anatolian Early Bronze 3, and it appears in Anatolia later than the various Keros-Syros forms, although these do in fact persist well into the Early Bronze 3 period at Troy and elsewhere.

Contacts on the mainland are still more numerous: duck vases occur in the Athenian Agora and are numerous at Aegina (pl. 12, 3 and 5); one indeed with its curious incised decoration recalls the little prototype from the Kastri at Syros (fig. 11.2, 1). Painted beaked jugs are found there too as well as pithoi. Incised wares at Aegina (pl. 10, 6) and Athens compare closely with the Phylakopi I style. Other rather similar fragments come from phases IV to I at Emborio in Chios, where they seem related in turn with the incised wares of Troy I and especially of the Yortan culture (Forsdyke 1925, fig. 15). But there is not enough evidence at present for very definite conclusions to be drawn from the Anatolian similarity.

Unfortunately the stratigraphical position of the Aegina finds is not recorded, and we have no proof that they are contemporary with the painted wares of the Tiryns culture found there, as one would suppose. Indeed although there are parallels for Phylakopi I in mainland contexts at the end of the early bronze age (e.g. an incised handle: Goldman 1931, fig. 168), the closest comparisons are to be found in the Middle Helladic period. Not only is the duck vase found (*ibid.*, fig. 255) but there is also at Eutresis a four-footed vessel of distinctive shape (*ibid.*, pl. XII and fig. 257) which is just like those found at Phylakopi (Atkinson et al. 1904, pl. IV, 7). We are thus led to set the Phylakopi I culture as contemporary with the end of the early bronze age and the beginning of the Middle Helladic period on the mainland. The difficulty here, however, is that it must be prior to Middle Minoan Ib and probably even to Middle Minoan Ia, since pottery of that style is found in the Second City. Such fine chronological matters can only be resolved by re-excavation at Phylakopi and the division there of both the First and Second City

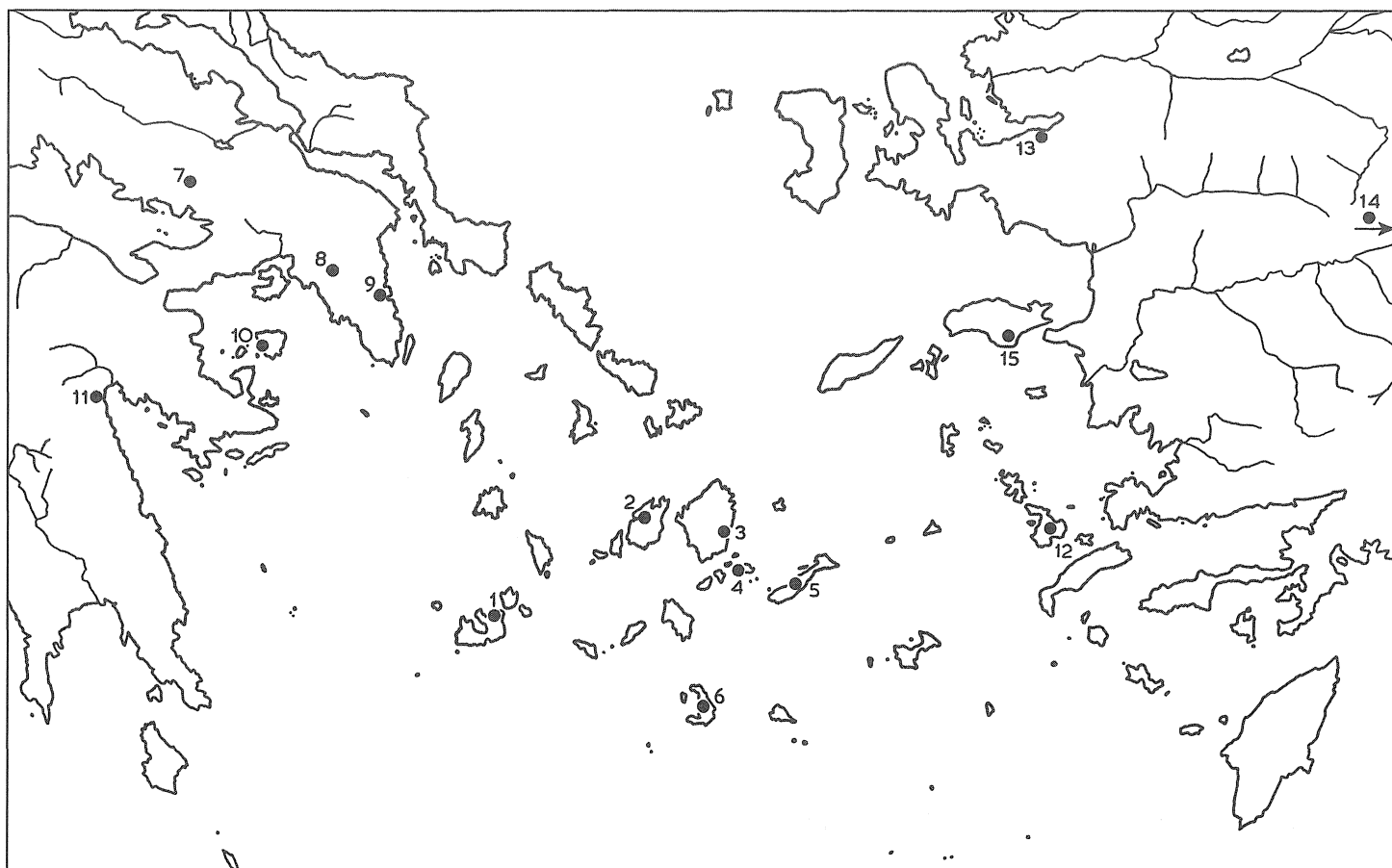


FIG. 12.4 Findspots of duck vases in the Aegean.

1, Phylakopi; 2, Paroikia; 3, Naxos, uncertain location; 4, Dhaskalio; 5, Amorgos, uncertain location; 6, Thera; 7, Eutresis; 8, Athens Agora; 9, Brauron; 10, Aegina; 11, Lerna; 12, Vathy; 13, Izmir; 14, Beycesultan; 15, Heraion. Not indicated: Troy.

periods into sub-phases. Until this is undertaken we must regard Phylakopi I as an early bronze age culture with affinities on the mainland that last into the middle bronze age.

Origins

So wide a range of new pottery forms in the First City might seem to suggest the operation of influences from the outside. Yet in fact all the essential aspects of the Phylakopi I culture can be traced back to the earlier cultures of the Cycladic early bronze age, although the excavation of another such deposit as that of square J1 at Phylakopi would be required to establish this in detail.

The suggested presence of Keros-Syros sherds in the twelfth half-metre there (*ibid.*, 86) is of some importance for the development of the culture. For dark-on-light painting could be derived from these (and at Phylakopi this was supposedly a lustrous technique at the outset), as also the rather glutinous slip seen on some Phylakopi I wares. The rectilinear designs on some Phylakopi I pottery may equally show Keros-Syros inspiration, and the beaked vase, although of a different shape at Phylakopi with an S-shaped profile and no separate neck, is clearly related to those of Early Bronze 2. The find of a proto-duck-vase at Kastri (fig. 11.2, 1) has already been noted and several duck vase spouts were found at the Keros-Syros site of Dhaskalio. The Kastri finds include also jugs with long vertical necks which might well constitute a prototype for the striking jug form at Phylakopi I. In addition, some of the Phylakopi I incised pottery is decorated with stamped concentric circles (pl. 10, 4; Atkinson et al. 1904, pl. v, 16), which is a prominent feature in Syros. The finds of folded-arm figurines at Phylakopi confirm this general impression of Keros-Syros influence, especially at the time of the Kastri group.

But the Grotta-Pelos culture must have had its impact too. In particular the pyxis form, although conical in Phylakopi I and cylindrical earlier, is a link, as is the taste for incised decoration. Rather close influences indeed can be found on some of the incised or painted pyxis lids of Phylakopi I, although their shape is slightly different.

The one-handed cup and the pithos can both be derived from earlier Cycladic forms, and the Melian bowl is in profile identical with those of the Troy I period (compare fig. 12.1, 1 with fig. 5.3, 11). Indeed amongst the Kum Tepe Ic examples are many with a lustrous slip which are indistinguishable from Phylakopi I finds. Even the kernos has respectable antecedents in the area: a simpler version was found in an early grave in the West Cemetery (pl. 11, 2) and this may be compared with one from Naxos (fig. 12.1, 4) and an example from Koumasa in Crete (pl. 11, 3). In this way all the principal ceramic forms of the Phylakopi I culture may plausibly be explained without looking very far afield.

The rock-cut tomb (fig. 7.6, 3-6) is, however, a new feature for the Cyclades, and indeed this form, with no shaft but a straightforward portal entrance, is a new one in the Aegean, although frequent enough in the west Mediterranean at about this time. But of

course there are rock-cut tombs in Euboia (fig. 7.6, 1–2) of comparable date, and very similar tombs from the same period have been found in Corinth (Heermance and Lord 1897). The earliest known from the mainland however is a shaft tomb of very similar type in the Athenian Agora (fig. 7.6, 8; Shear 1936) which contained pottery to be dated to the end of the neolithic period. The tombs of Phylakopi thus have respectable antecedents in the west Aegean. Once again therefore we are faced in Attica or the Cyclades with an earlier practice of burial customs than is seen in Anatolia, where they are often considered to have originated.

The Phylakopi I culture, together probably with the Kastri and Amorgos groups—the tail end of the Keros-Syros culture—brings the Cycladic early bronze age to a close. Although a delightful and individual ceramic tradition persists, the independence of the Cyclades is at an end, and for the remainder of the prehistoric period the islands fall within the cultural sphere of Crete or of the mainland.

Chapter 13

Aegean Interrelations and Chronology

in the Third Millennium BC

The culture sequences established in preceding chapters for each region of the Aegean rest essentially on internal evidence, wherever possible on stratigraphic evidence, within that region. In this way the regional sequences are logically independent one from another. Fortunately there were contacts and relations between the different areas which make cross-dating possible, and the validity of the internal sequences can be checked. No important contradictions arise. There is controversy concerning only one fundamental point: the relationship of the Troy I culture to the remainder of the Aegean. Mellaart and French take the view that Troy I should be set very early, beginning before the onset of the Helladic early bronze age. At the other extreme are the advocates of a 'short chronology', notably Hood and Milošević, who do not accept the validity of radiocarbon dating, and set many of the Aegean cultures very much later than do other scholars (Milošević 1967). Fortunately there is a middle way between these positions.

Using the various 'cultural parallels'—which in only a few cases are actually imports, more often simply similarities of form—the culture sequence of each region may be related to the others, yielding an overall and unified view of the Aegean culture sequence in the third millennium BC. Radiocarbon dates provide further, essentially independent, control of these sequences and their interrelationships.

These different approaches allow the construction of a tentative chronology. This reconstruction of the sequence of events, and their dating, is a necessary preliminary to the consideration, undertaken in succeeding chapters, of the processes at work in the Aegean at this time.

The Cyclades hold a key position since they, alone at this time, had evident contacts with four of the other five regions in the Aegean. Crete, in particular, has strong contacts with the Cyclades, and few with other regions of the Aegean. These contacts can be used to link the Cyclades and the Cretan sequence (fig. 13.1, stage I).

The cultures of southern Greece can then be taken into consideration, yielding a series of chronological links for the southern Aegean (stage II). The cultures of the Troad may be linked with the sequence so established, bringing western Anatolia into the chronological framework (stage III). And finally the two remaining regions, Thessaly and Macedonia, are added. Their interrelations with the other regions are not entirely clear, yet by their inclusion the broad outlines for the chronology of the entire Aegean in the third millennium can be established (stage IV).

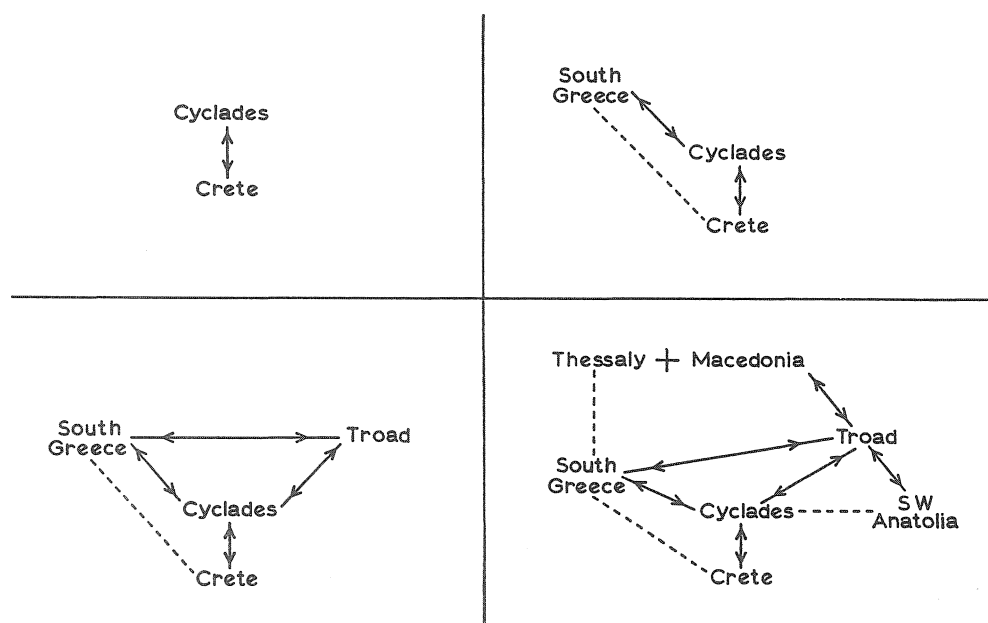


FIG. 13.1 The underlying logical structure for the relative chronology of the third millennium. The diagram shows that the relative chronology of Crete and the Cyclades is first determined, and then tied in with south Greece. Other regions of the Aegean can then be related to the chronological framework established.

In general the more recent cross-datings are the more secure, and it will be most convenient to begin in each case with the middle bronze age interrelations.

The terms Early Bronze 1, Early Bronze 2 and Early Bronze 3 for the Aegean are used throughout to designate very approximate periods (not cultures). Early Bronze 2 for instance was the time of the Early Minoan II, the Korakou culture, the principal phases of the Keros-Syros culture (excluding the Kastri and Amorgos groups) and Troy II. But to set the Troy I culture in Early Bronze I together with the Eutresis culture is not to see them as precisely coterminous. The Troy I culture may have begun slightly later than the Eutresis culture, and it clearly persisted well into the time span of the Korakou culture. The most appropriate definition for these terms is to set Aegean Early Bronze 1 contemporary with the Eutresis culture, Early Bronze 2 with the Korakou culture (as,

for example, at Lerna) and Early Bronze 3 with the Tiryns culture, together perhaps with the Lefkandi I assemblage.

In the eastern Aegean the terms are often defined so as to coincide with Troy I, Troy II and Troy III–V respectively (Mellaart 1962, 8). The definition followed here is not so very different, if allowance is made for this possible chronological priority of the Eutresis culture over Troy I.

Stage I. The Cyclades and Crete

MIDDLE MINOAN AND PHYLAKOPI II

The Second City at Phylakopi yielded, amongst its own characteristic painted ware and quantities of Minyan ware, a good number of sherds evidently imported from Crete.

Nothing was added by the work of Dawkins and Droop (1911, 9) to Mackenzie's infinitive statement: 'Thus the Cretan polychrome ware appears in early floor-deposit of the Second City at a time when geometric ware is still current, though the transition to curvilinear design is in process of being accomplished.... The Cretan polychrome ware probably began to be imported in the early period preceding that for which we have the evidence of floor deposits, and its occurrence attains a maximum in the middle period of the Second Settlement' (Mackenzie in Atkinson et al. 1904, 260). Mackenzie goes on to state that the Cretan polychrome ware (i.e. Middle Minoan Kamares ware) did not occur in the later period of the Second City, where the pillar houses and frescoes relate to the end of the Middle Minoan period (*ibid.*, 40; 70 f. and pl. III). Melian bird vases,

TABLE 13.1 Imports of Middle Minoan pottery to Phylakopi.

<i>Phylakopi</i> (Atkinson et al. 1904)	Åberg <i>Chronologie</i> (1933)	<i>Possible Minoan phase</i>
fig. 126	–	Middle Minoan IIa
fig. 127	–	Probably MM I
fig. 128	fig. 332	MM IIa
fig. 129	–	MM Ia (?)
fig. 130 (and pl. xxiv, 10)	–	MM IIa
fig. 131	–	Classic MM IIa
fig. 132	–	Classic MM IIa
fig. 133	fig. 329	Classic MM IIa
pl. xxiv, 8	–	MM II
–	fig. 326	MM I
–	fig. 327	MM I
–	fig. 328	MM II
–	fig. 330	MM IIa
–	fig. 331	MM IIa
–	fig. 333	MM IIa

dating from the end of the Second City and the beginning of the Third were found in the Middle Minoan III Temple Repositories at Knossos (*ibid.*, pl. XXI; Evans 1921–25, I, 557).

Some of the imported Kamares ware is seen in pl. 13, 4. Its suggested dating in Cretan terms may be indicated as seen in Table 13.1.

Thus the early levels of the Second City at Phylakopi may be equated with the Middle Minoan I and II periods.¹ And the find in Middle Minoan Ib deposits at Knossos (pl. 13, 2; Hood 1963, 94; Renfrew 1964, pl. H', 4) of fragments of a Cycladic jug, in the Second City curvilinear style, confirms the link. At present we cannot be more specific than to say that Phylakopi II and Middle Minoan I began at about the same time. It is possible that some of the very early Middle Minoan Ia material (Hood 1963, 93) which some scholars perhaps would class as 'Early Minoan III' may antedate the foundation of the Second City at Phylakopi. The presence of eight cups in a cist grave at Aïla in Naxos (Papathanasopoulos 1961–62, 131, pl. 63–64) of a form spanning the Middle Minoan I to Late Minoan Ia periods does not contradict this finding.

THE KEROS-SYROS AND PHYLAKOPI I CULTURES AND EARLY MINOAN II

The Phylakopi I culture has few links with Crete. A kernos from a very early phase of the First City at Phylakopi (pl. 11, 2; Bosanquet 1896–97, 54, fig. 3) resembles a vessel from Koumasa (pl. 11, 3; Xanthoudides, 1924, pl. I, 4194). And a bottle at Mochlos (Seager 1912, 53, fig. 23, XVI, 15) resembles finds from Naxos and Amorgos (Papathanasopoulos 1961–62, pls. 51b and 61; Tsountas 1898, pl. 9, 26).

Apart from the Kythera discoveries (Coldstream 1970) few Early Minoan II objects have been found outside Crete. They include an incised clay pyxis from Thera (Zervos 1957, fig. 59) and an alabaster bowl, a surface find at Phylakopi (Atkinson 1904, 196, fig. 165; see also Warren 1969b, where other possibilities are discussed). There are, however, numerous similarities linking the Keros-Syros culture finds with those of Early Minoan II. They fall into three main classes: marble figurines, stone bowls and metal objects.

The folded-arm figurines of the Cycladic Keros-Syros culture were certainly copied in Crete. Local marble was available, and a distinct group of figurines, the Koumasa variety, may be recognised (Renfrew 1969a, 18; Renfrew and Peacey 1968). They are generally small in size, very broad in the shoulder and short in the leg. In profile thin and exceedingly flat, they differ from folded-arm figurines of Cycladic manufacture in that the head is usually not separated from the neck except by a light incision (pl. 30, 3, 4 and 6; fig. 19.7). Seventeen of these locally produced figurines are known in Crete, five of them from the tombs at Koumasa, and one from the pure Early Minoan II level in the *tholos* at Lebena. An example, already mentioned, of Early Minoan I–II date came from the Pyrgos burial deposit. This Koumasa variety must be regarded as an imitation of the true Cycladic folded-arm figurine of which some ten have been found in Crete.

¹ The Cretan period divisions in Table 13.1 must be regarded as tentative. I am grateful to Mr Sinclair Hood for comments on photographs of the Cretan pottery from Phylakopi; but without the opportunity for him to handle the material these were of necessity provisional.

A very important link again is the series of vessels, usually carved in green chlorite schist, which have been found, generally in Keros-Syros contexts, in Naxos, Amorgos, Syros and Melos, and especially in some quantity in Keros (pl. 15, 1; Naxos: Zervos 1957, pl. 30; Amorgos: Dümmler 1886, 17; Syros: Åberg, 1933, 83, fig. 153; Melos: Zervos 1957, pls. 28–29). Many of them show spirals in relief, and incised cross-hatching. As Warren (1965, 10) has shown, the earliest stone vessels of Crete, early in the Early Minoan II period, are of this material and style. It is not clear if they originated in one region rather than the other, but the close similarity is undeniable.

The other stone vessels showing similarities are in white marble—two pyxides from Aghios Onouphrios (pl. 6, 5 and 6; Evans 1895; Åberg 1933, 83, fig. 156)—compare with examples from Syros and other islands (pl. 6, 3 and 4). Several fragments of such pyxides have recently been found in Keros. Spouted bowls, with lugs set near the rim, found for example at Trapeza and Mochlos compare in form with the series from Syros (Pendlebury et al. 1936, pl. 16; Seager 1912, pl. vi; Tsountas 1899, fig. 26). Dr Warren kindly informs me that the Minoan examples differ from the Cycladic in the out-turning spout, flat base, and lug shape.

The third major class of material showing close similarities is the metalwork. Among the copper forms common to the Keros-Syros culture and Early Minoan II are tweezers (Branigan 1968a, 34; Tsountas 1899, pl. 10, 40–22; cf. Papavasileiou 1910, pl. H) and mid-rib daggers (Classes IVa and IVb of the Cycladic classification, corresponding chiefly to Long Daggers Types III to VI of Branigan's Cretan classification: Renfrew 1967a, 11; Branigan 1967a). The close relationship between the daggers of Crete and those of Amorgos apparently persisted from Early Minoan II into the Middle Minoan I period.

One or two further points of similarity must be noted: the curious little stone pestles generally rather attractive in appearance and seen, for instance, in the Trapeza Cave (Pendlebury et al. 1935–36, pl. XIXr), and at numerous other Cretan sites, are common at Chalandriani in Syros and other Keros-Syros sites (Tsountas 1899, pl. 10, 36). They occur in the Korakou culture of the mainland (Blegen 1928, pl. XII, 14–21 and 198). Amongst the pottery, a little footed cup from the Pyrgos Cave resembles vessels from Syros (Xanthoudides 1918, 145, fig. 6, 22 [Herakleion Museum 7496]; Tsountas 1899, pl. 8, 13 and 16). At the very beginning of Early Minoan II at Gournia is a plain-footed cup like an example from the Grotta-Pelos settlement at Pyrgos in Paros (Boyd Hawes 1908, pl. XII, 12; cf. Evans 1921–35, I, fig. 17; Tsountas 1898, pl. 18, 15) and others from Naxos. It is possible that this is the prototype for the little chalices in Vasiliki ware. On the other hand there is nothing particularly Cycladic about the incised pyxis from the Vat Room deposit at Knossos (Evans 1921–35, I, 166), and the ceramic affinities are much less important than those in stone and metal.

These similarities establish the broad chronological correlation between the Keros-Syros culture and Early Minoan II. The later part of Early Minoan II (together with 'Early Minoan III') lasted through much of the duration of the First City at Phylakopi. There is no clear indication as to whether Early Minoan II began slightly before the inception of the Keros-Syros culture or vice versa.

THE GROTTA-PELOS CULTURE AND EARLY MINOAN I

Contacts between Crete and the Cyclades, before the time of the Keros-Syros culture, were few, although of course Melian obsidian had been imported into Crete from the early neolithic period. The schematic figurines of Crete have an origin in the neolithic period (Ucko 1968, pls. xxxix and liii) just as the Cycladic ones go back to the neolithic Saliagos culture. Cycladic marble vessels have not been found in Crete before the Early Minoan II period.

TABLE 13.2 The relative chronology of the Cyclades and Crete in the third millennium BC.

	CYCLADES	CRETE
M.B.A.	Phylakopi II 2 Phylakopi II 1	MM. I b/II MM. I a
E.B. 3	Phylakopi I Kastri g.p.	"E.M. III "
E.B. 2	Keros-Syros	E.M. II
E.B. 1	Grotta-Pelos	E.M. I
FINAL NEO.		"sub neo "

Certain similarities in the pottery are, however, suggestive. Probably the only Cycladic imports to Crete at this time are the five incised bottles from the Pyrgos Cave (pl. 5, 6; Xanthoudides 1918, figs. 8.44-45 and 9.67-69) which are closely paralleled by finds from Antiparos, Paros, Naxos, and Melos (pl. 5, 3-5; Varoucha 1925-26, 104, fig. 7; Zervos 1957, pls. 86-87).

The Cycladic cylindrical pyxis of clay which is never supported on feet finds a rare counterpart in Crete in the incised example from Paterna near Palaikastro (pl. 5, 1; Bosanquet and Dawkins 1923, fig. 2). The decoration resembles that of the poorer Grotta-Pelos pyxides (pl. 5, 2; cf. Papathanasopoulos 1961-62, pl. 65) but in all the Cycladic examples known there are vertical suspension lugs. The Paterna pyxis is probably not an import. In general the Cycladic pyxides have simple flat lids, while the Early Minoan lids have deep-sided flanges coming right down over the body of the pyxis. Another form common to both areas is the spherical pyxis with high suspension lugs

(Xanthoudides 1918, figs. 5.9 and 7.33–35; Papathanasopoulos 1961–62, pls. 43b and 67a). The curious ‘frying pan’ in the Giamalakis collection (Marinatos and Hirmer 1960, pl. 5), with its idiosyncratic decoration, is without Cycladic or other parallel, and its authenticity may not be beyond question.

The points of contact are not numerous, and do not support the suggestion, made by some scholars, of considerable Cycladic influence upon Crete at this time (Åberg 1933, 242; Hutchinson 1962, 140). Pyrgos ware, for instance, has no counterpart in the Cyclades, nor do the ‘suspension pots’ of Crete have any very close Cycladic parallels. The two regions were certainly less closely linked culturally at this time than in the succeeding period.

The various similarities noted in the two culture-sequences allow the very approximate chronological equation seen in Table 13.2.

Stage II. The Cyclades, Crete and the Mainland

The numerous cultural connections between the Cyclades and southern Greece in the early bronze age allow the incorporation of the mainland cultures into the developing chronological framework. It will be seen that direct connections between Crete and mainland Greece are very rare at this time.

THE MIDDLE HELLADIC

No identifiable Middle Helladic pottery has been reported from stratified deposits in Crete, although it is common at Cycladic sites. The characteristic ‘Minyan’ ware had not been so termed in 1904 at the time of the publication of the Phylakopi excavations, where it was known as ‘Lesbian ware’, and ‘does not occur in the lower strata’ (Atkinson et al. 1904, 154, fig. 137 and pl. XXIV, 14). By 1911 the name ‘Minyan’ was being applied, and this ware was commonly found with Kamares ware in deposits of the Second City (pl. 13, 5–6); Dawkins and Droop 1911, 17 and pl. VII, 27).

Similar finds have been made at settlements on many islands (Scholes 1956, 15 f.) including Paros (Paroikia), Naxos (Grotta), Mykonos (Palaiokastros), Siphnos (Kastro), Tenos (Akroterion Ourion) and Kea (Aghia Irini). Only at Aghia Irini is it well stratified (Caskey 1964d, 320 and pl. 49), together with local wares (including Middle Cycladic) and imported Cretan Kamares ware. Minyan ware has also been found in cist graves in Siphnos and Syros (Tsountas 1899, pl. 9, 6, 24 and 27).

Cretan pottery of the middle bronze age is found in several contexts on or near the mainland, as well as at Phylakopi. It occurs at Aghia Irini on Kea, at Kastri on Kythera, in poorly documented contexts at Aegina, and most notably at Lerna (Åberg 1933, 40, fig. 64; for Asine, Frödin and Persson, 1938, 275 etc.; for Dendra, Persson 1942, 15, fig. 6.5).

Much of the Middle Helladic matt-painted pottery shows Cycladic influence, chiefly of the painted wares of the First City at Phylakopi. At Eutresis in the early Middle Helladic levels, a series of pots was found with strong Cycladic resemblances. Most notable are the duck vases (Goldman 1931, 184, figs. 255 and 256.1), which are very similar to those of the First City at Phylakopi, and a footed vessel with stamped concentric circles very similar in shape to a pot from Phylakopi I (ibid., fig. 257 and pl. XII, I; Atkinson et al., 1904, pl. IV, 7). At first sight these parallels for Phylakopi I material tend to call in question the Phylakopi II/Middle Helladic correspondence, but this is clearly documented by the Lerna finds. Miss Goldman observed that the Eutresis finds were probably locally made, and not all the stamped and incised pots have good Cycladic parallels (stamped concentric circles do not often occur in the Phylakopi I culture where the best parallels for the shapes occur). Similar decoration is, in fact, found on Minyan ware at Eutresis (Goldman 1931, 143, fig. 197). Only the re-excavation of Phylakopi and the careful distinction between the First and Second City periods could be expected to resolve this problem. At the moment it does not seem necessary to bring the duration of the Phylakopi I culture down into the Middle Helladic period.

THE TIRYNS CULTURE

The Aegean contacts of the Tiryns culture are not so numerous as those of the succeeding middle bronze age or of the preceding Korakou culture.

At Lerna there is a painted *depas* cup, and a ribbed *depas* cup at Tiryns (Caskey 1955a, 37 and pl. 21, 1; Müller 1938, pl. XXXII, 5 and 7). These may be compared with those from Kastri near Chalandriani on Syros and more closely with examples from Early Bronze 3a Beycesultan (Lloyd and Mellaart 1962, 249). The rather squat marble *depas* from Lerna compares with a pottery one from Kastri as well as with examples from Troy (Caskey 1956, 164, fig. 4; Bossert 1967, fig. 4.1). Duck vases, which probably belong to this period, and which very closely resemble those of the Phylakopi I culture occur in the Athenian Agora, and are numerous at Aegina (pl. 12, 3 and 5). One of those from Aegina, with its curious incised decoration, recalls the little prototype from Kastri on Syros. And the incised wares of Athens and Aegina (pl. 10, 6), especially the conical pyxides and lids, compare closely with the Phylakopi I decorative style (pl. 10, 5).

The characteristic shape of the Phylakopi I jugs (pl. 10, 2), with their backward stretching necks, is seen again at Aegina and in a white-painted example from the Tiryns culture levels at Eutresis (Goldman 1931, 120, fig. 163.2). The contemporaneity of the Phylakopi I and Tiryns cultures, and of both with later Early Minoan II, is established.

The Lefkandi I assemblage also falls at this time, during the Aegean Early Bronze 3 period. As indicated in Chapter 7 and Appendix 2, it has very close affinities with the Kastri group of the Keros-Syros culture. Common forms include stiff-necked jugs, like those of Manika, baking plates and one-handed cups in very shiny, dark fabric. The close Anatolian connections of this body of material have already been stressed.

THE KORAKOU CULTURE

The Korakou culture is so closely related to the Keros-Syros culture of the Cyclades that their essential contemporaneity is obvious, and forms a basic foundation for any chronology of the prehistoric Aegean. Yet it is important to emphasise that these are distinct cultures and not a single unified whole. The pottery alone establishes the distinction: of the three key forms of the Korakou *Urfirnis*-ware pottery—the ‘sauceboat’, the footed bowl, and the askos—only the first is common in the Cyclades. The chief occurrences are at Chalandriani in Syros, at Dhaskalio on Keros and at Spedos on Naxos. The footed bowl is seen at Chalandriani and occurs on Antiparos, but is not a common form. Again the Syros type ‘frying pans’ and stamped jars on a pedestal base are very rare on the mainland. No complete Syros ‘frying pans’ have been found at sites of the Korakou culture, although a footed jar was found at Askitario (Theochares 1954a, fig. 26). And folded-arm figurines on the mainland appear to be imports, although they are common enough in Attica and Euboia (fig. 11.5) and occur as far west as Elis (fig. 20.5). Nor are such specifically Cycladic customs as burial in cist graves or built graves of the Syros type, widespread except in Attica until the Middle Helladic period.

Many of the similarities derive indeed, not only from close cultural content but from a parallel development—fortifications, the development of metallurgy, and so forth are functional developments. But even so, we have plenty of specific parallels which are clearly the result of contact.

Among the pottery forms, the ‘sauceboat’—universal in the Korakou culture—is widely found in the Keros-Syros culture as we have seen. Jugs are a common feature in both areas, where they make their appearance at this time. Often they have painted decoration: an example from Askitario compares with those of Syros and Naxos (ibid., fig. 6). A further very widespread form is the one-handled cup, seen on the mainland at Eutresis (where it appears first in the Eutresis culture) and at many other sites (fig. 20.5). In the Cyclades it is known from Syros, Siphnos, Delos and other islands. A single example of this form is known from Crete, from the Early Minoan I levels at Lebena (fig. 20.4, 2). The two-handled cup, an Anatolian form, is found at Orchomenos and at Syros, and its first appearance seems to be at this time. *Urfirnis* ware is a fabric at home on the mainland, while it is seen at Syros and especially Keros. And in both regions, patterned ware makes its appearance. Formerly thought in the mainland to be exclusively an ‘Early Helladic III’ (i.e. Tiryns culture) feature, it is now seen to have also distinctively Korakou culture motifs also, which relate to those of the Keros-Syros culture.

Stamped decoration of pottery is seen on the mainland, as in the Cyclades, but in detail the forms and decoration often differ: the matter is discussed in Appendix 2.

A second and perhaps more important range of contacts is documented by the metalwork. Almost all the Korakou culture forms are paralleled in the Cyclades—midrib daggers, tweezers, double spiral pins, axe-adzes, as well as flat axes. These forms are

discussed again in Chapter 16. Some of them are seen in Early Minoan II Crete, and in north-west Anatolia from the Troy II period onwards. What has been called a culture continuum is seen at this period: the tweezers, for example (figs. 11.3 and 16.7), seen widely in Crete, the Cyclades, and the mainland are a form which probably had a single inspiration.

There are important parallels in stone too. Cycladic folded-arm figurines of marble have been found at several sites in mainland Greece (fig. 20.5). Marble bowl fragments, possibly of Cycladic manufacture, are known from Zygouries and elsewhere. A bowl fragment from Tiryns of steatite or chlorite schist may be compared with those of the Keros-Syros and Early Minoan II cultures. Reference has been made above to the pestles common also in Crete and the Cyclades at this time.

Sealstones are found in mainland Greece in the Korakou culture, and the large collection of sealings from Lerna (fig. 7.7) indicates that many of them had designs similar to (but not identical with) those of Crete. A sealstone from Aghios Kosmas in Attica is Cretan in form and may be of Cretan manufacture (Mylonas 1959, fig. 166.13). The angle-filled cross is a common seal design occurring in the Cyclades as well as in Anatolia and Crete. The decorated bone tubes in the Levkas cemetery (fig. 18.3) are similar to those from the tombs at Chalandriani of Syros.

To list in detail all the points of comparison between the Korakou culture and the Early Minoan II and Keros-Syros cultures would be superfluous. The numerous similarities between them emerged partly as the result of parallel development, but also in consequence of contacts which the actual imported pieces document. Abundant Early Minoan II pottery is found, for example, at Kastri on Kythera: sherds of the Eutresis and Korakou cultures nearby apparently derive from an earlier phase of occupation.

The broad chronological position of the Korakou culture is thus clear. Its beginning may be set approximately contemporary with that of the Keros-Syros and Early Minoan II cultures, and its end is apparently determined (in some places at least) by the inception of the Tiryns culture, contemporary with the First City of Phylakopi.

THE EUTRESIS CULTURE

The Eutresis culture, a dimly known entity, is characterised solely by its red-slipped pottery, several ceramic shapes, and the presence of stamped and incised pottery.

The red-slipped pottery (Eutresis groups III–V), together with the heavy slipped and burnished ware of the preceding group II, may be compared in general terms with the burnished bowls found in settlements of the Grotta-Pelos culture. They have a general similarity also with the burnished pottery of Kum Tepe Ib in north-west Anatolia.

The equation is carried a little further by the Palaia Kokkinia finds, which again relate to the Grotta-Pelos culture: spherical pyxides with vertical suspension lugs (Theochares 1951, fig. 25) find parallels in Naxos and other islands. The marble head of a figurine (*ibid.*, fig. 30 c) resembles the Louros type in form, and the 'frying pan' (or decorated

pyxis lid; *ibid.*, fig. 26) like others of the mainland type is to be set alongside the Kampos type 'frying pans' of the Grotta-Pelos culture (see Chapter 10 and Appendix 2).

These few points of similarity make a reasonable basis for equating the Eutresis and Grotta-Pelos cultures chronologically. The equation is admittedly an approximate one.

The Aegean links, as so far discussed, give relative chronologies as shown in Table 13.3.

TABLE 13.3 The relative chronology of the Cyclades, Crete and Mainland Greece in the third millennium BC.

	CRETE	CYCLADES	MAINLAND
M.B.A.	MM I a	Phyl.II	M.H.
E.B. 3	"E.M.III"	Phyl.I / Kastri gp	Lefkandi I / Tiryns
E.B. 2	E.M.II	Keros-Syros	Korakou
E.B. 1	E.M.I	Grotta-Pelos	Eutresis
FINAL NEO.	"sub.neo."		Eutresis Gp.II

Stages III and IV. Western Anatolia and the Aegean

The numerous chronological links between the Troy culture sequence and those of the Cyclades and the Greek mainland make chronological correlation easy, at least from the time of Troy II onwards. Before this period the matter is somewhat controversial. Once again it is simplest to consider first the end of the early bronze age, and to work backwards.

TROY III–V

The numerous resemblances between the pottery of Troy VI and Middle Helladic Greece are very evident. Similar 'Minyan' ware was found in the Second City of Phylakopi, and on several Cycladic sites. Through much of the preceding Early Bronze 3 period, contact was already fairly close.

The external connections of Troy III are admittedly few and rather indecisive: the Aegean wares recovered by Blegen in Troy I levels were still imported, many of them doubtless from the Keros-Syros culture. As Blegen (1951, 10) suggests, Troy III may be set at a time transitional between the Korakou and Tiryns cultures.

With the Troy IV period contacts are much more numerous. The short *depas* cup of the Tiryns culture (Müller 1938, pl. xxxii, 5 and 7) is related to the Trojan form A44. A fragment of Tiryns culture painted ware was found at Troy and is assigned by Blegen to this period (1951, 109 and fig. 170.10). A winged jar from Lerna IV may well be an import from Troy IV (Caskey 1954, pl. 11, b).

The place of the Manika jugs in the mainland sequence has already been discussed: they are closest to those of Troy IV (Blegen et al. 1951, 110).

Contact with the Phylakopi I culture of the Cyclades is established chiefly by the presence of duck vases in Troy IV and V (ibid., 136 and 249, and figs. 170.13 and 243). Those of phase IV at the Heraion in Samos, dated by Milojević to the Troy IV period (1961, pl. 18), are particularly close to the form of Phylakopi I.

From Kea comes a two-handled cup (Caskey 1964b, 320 and pl. 49, a) comparable with examples in Heraion IV; French (1967b, 36) has compared them also with a specimen from Beycesultan level VI.

A chronological problem which arises in the case of Troy V is that the bowls decorated with a painted red cross, seen in this period, first make their appearance at Lerna in the Korakou culture (Blegen 1951, 227 and 250, and fig. 246; Caskey 1960a, 290 and pl. 69, d). Caskey attempted to solve the problem by regarding the similarity as fortuitous, but it is as close as the others which we have been using. Is it possible that this feature originated in mainland Greece, where painted wares were, of course, a fairly common feature anyway?

These various parallels are sufficient to establish the broad contemporaneity of Troy IV–V with the Tiryns culture, and with the Phylakopi I culture.

The finds from the latest occupation at Chalandriani in Syros, the Kastri group, belong as we have seen to the Troy III and Troy IV periods. Although the short *depas* cup occurs in Troy II period contexts at the Heraion in Samos, it has similarities with form A37 of Troy IV. The little askoi from the Kastri excavations differ both from those of Phylakopi I and the Anatolian ones, which make their appearance in the Troy IV period. They are smaller and have a loop handle on the back, separated from the spout. The beak-spouted jugs, one with a strongly emphasised beak, do indeed look more Anatolian than Cycladic (Bossert 1967, fig. 3.3) and the long neck and emphasised spout first occurs in Troy III, and is common in Troy IV (Blegen et al. 1951, figs. 72 and 161). These forms occur in the Troy IV period at the Heraion on Samos (Heraion IV: Milojević 1961, pls. 16, 1; 22, b), and they are not unlike some of the jugs from Manika. The relations of the Kastri group are further discussed in Appendix 2. It is clear that the Kastri settlement at Chalandriani persisted well into the Troy IV period: its chronological overlap with Phylakopi I is clear.

TROY II

The most famous ceramic shape of Troy II, the *depas amphikypellon* appears first in phase IIc, and persists into early Troy IV. It is found at Orchomenos (Kunze 1934, 56, no. 45), probably in a Korakou culture context, and in the Keros-Syros culture fortified settlement at Kastri on Syros.

Further proofs of contact are extremely frequent: the great treasures of Troy IIg contained a double sauceboat (Schmidt 1902, no. 5863) clearly related to mainland and Cycladic forms. The double spiral pins compare in shape with those of Syros, and there are other resemblances also among the metal forms. The silver tweezers from Troy (Blegen et al. 1950, 281) relate to those of Early Minoan II Crete and the Korakou and Keros-Syros examples already discussed. Once again the parallels in the metal types are too numerous to require listing in detail.

The bone tube from Troy decorated with incised patterns (Schliemann 1880, 526; Schmidt 1902, no. 7960) is related to those of Syros, and a piece of bone decorated with concentric circles (Blegen et al. 1950, fig. 365) may be compared with a bone object from Dümmler's grave D at Kapros in Amorgos (Renfrew 1967a, pl. 4.25). The little spool from Troy IIg (Blegen et al. 1950, 211) is very similar to the small pestles from Crete, the Cyclades and mainland Greece in the Early Bronze 2 period, to which reference has already been made.

The most important find, chronologically, is the 'Early Aegean 'Ware' imported probably from mainland Greece, which Blegen recognised in levels of Troy I and Troy II. It is discussed further in the next section, and whatever its significance for Troy I, it substantiates that Troy II and the Korakou culture (as well as the Keros-Syros culture) were broadly contemporary.

TROY I

The most significant ceramic development in the Troy I period is the jug, although the form is seen rather earlier at Kum Tepe and Poliochni I. The jug makes its appearance in Crete in the Early Minoan I period, and despite the manifest differences in the two cultures there are other points of resemblance. The curious barrel shape of Troy I, seen also at Karataş-Semayük (Blegen et al. 1950, fig. 231; Mellink 1965, fig. 32) occurs at Lebena in the Early Minoan I level. So too does the one-handled cup, seen in the Eutresis culture (at Eutresis) and widely in the Troy I culture (form A24; Blegen et al. 1950, fig. 226). Many pots, both in Crete and the Troad, stand on little feet, although this is a feature not seen in the Cyclades or on the Greek mainland. The handled pyxis-covers at Troy find a parallel in the Pyrgos Cave (ibid., fig. 231; Xanthoudides 1918, fig. 9.61). Other parallels have been listed by Warren (1965, 37). They are sufficiently numerous to suggest contact between Crete and Troy at this period, and to indicate considerable overlap in the duration of Troy I and Early Minoan I.

Close similarities are not evident between the forms of Troy I and those of the Grotta-Pelos culture or the Eutresis culture. The broad resemblance in the monochrome burnished wares is, however, inescapable, and includes the use of both horizontal and vertical lug handles. In general the incised decorative styles do not closely resemble one another, but a flask from Thermi is like the Grotta-Pelos bottle form (Lamb 1936a, pl. XIII, 565; Varoucha 1926, 104, fig. 7).

Schematic figurines are abundant in Anatolia at this time, chiefly the figure-of-eight Troy I type (Renfrew 1969a, 27): a similar form was found in the Early Minoan deposit at Lebena. The Cycladic figurines, although similarly schematic, are rather different in shape.

Towards the middle of Troy I some very important new elements occur in the Troad, largely in the form of imports. They are clearly ascribable to the Keros-Syros and Korakou cultures of the Cyclades and the Greek mainland. As we shall see they lead to the very important conclusion that the Korakou and the Keros-Syros cultures were under way by the middle Troy I period.

Blegen is categorical on this point: a number of the sherds of glazed ware (i.e. *Urfirnis* ware) 'are recognisable as genuine Early Helladic ware' (1950, 40 and 54). Three of them are painted (*ibid.*, figs. 241.14 and 252.1-2), comparing closely with the Keros-Syros and Korakou painted ware.

Mellaart and French, intent on establishing a very long chronology for Troy, have tried to set this evidence aside. Mellaart (1957, 79) rather rashly implied that Blegen did not correctly identify the supposed import sherds. French (1961, 117) has examined them himself, and supports Blegen's identification, but suggests that the context at Troy was unclear.

The Troy evidence is, however, backed up by the 'sauceboat' fragment from Thermi V (Lamb 1936a, 90, fig. 524; admittedly later than middle Troy I) and by imported sherds at Poliochni Blue (Brea 1964, pl. LXXX, a and b) and especially Green/Red, where there is an imported 'sauceboat' fragment (*ibid.*, pl. CXXIX, c). I have examined this sherd: it is a 'sauceboat' spout resembling those of the Keros-Syros and Korakou cultures.

Other forms occur at this time, which apparently appear in Early Minoan II and the Korakou and Keros-Syros cultures. The stone pestles of Poliochni and Thermi are a case in point (*ibid.*, pl. CLXXXVII, 16; Lamb 1936a, pl. XXIII, 30, 56), and the bone tube at Poliochni (Brea 1964, pl. CLXXVIII, 12). The one-handled cups at Poliochni (*ibid.*, pl. CXLIII) look closer to those of the Korakou and Keros-Syros cultures than to the rare examples in the Eutresis culture. While the presence of metal need have no chronological significance, a bird-headed pin at Thermi closely resembles those of bone from Syros (Lamb 1936a, pl. XLVII, 31, 19; Tsountas 1899, pl. 10).

It is concluded that early Troy I is a contemporary of the Early Minoan I, Eutresis and Grotta-Pelos cultures, which end during middle Troy I. Late Troy I is contemporary with what may be termed the Early Bronze 2 cultures of the central and western Aegean.

One minor chronological problem which arises in connection with the Troy I finds is presented by the presence of clay hooks and anchors at Thermi and Poliochni (Lamb 1936a, pl. XXIV, 31, 78; Brea 1964, pl. LIII, a–k). They occur also in Sitagroi Vb and at Michailitch, a site of the developed Cernavoda-Ezero culture in south-east Bulgaria. At Lerna, however, they appear during the Tiryns culture (Caskey 1960a, 297), and at Argissa in 'Early Thessalian III' (Milojčić 1960, 28). Their distribution in the Mediterranean has been well summarised by Evans (1956, 99). An example from Eutresis was claimed by Miss Goldman as Early Helladic I (1931, 196 and fig. 291.1), that is to say of the Eutresis culture, although some of her Eutresis culture material is now assigned to the Korakou culture. It seems likely, therefore, that the absence of this form from Lerna III is without chronological significance.

THE FINAL NEOLITHIC

The stratified finds of this period are so scanty in western Anatolia that only a few general similarities can be drawn. In the first place the open bowls of Kum Tepe Ib, with their heavy, burnished fabric and their rolled rims, closely resemble those from Grotta-Pelos settlements in the Cyclades. As already mentioned in Chapter 10, closely similar shapes are found in Emborio VII and VI. Curiously, however, at Poliochni in the presumably contemporary Black period, the rolled rim is not seen, and a slightly out-turned rim, with tunnel lug, also seen at Emborio, takes its place.

David French has emphasised the widespread distribution of these burnished wares (1961, 111 and 196). Certainly the burnished ware of the Eutresis culture, and especially of Eutresis Group II might be related. But these examples lack the rolled rim, and generally are without tunnel lugs. At present such resemblances are rather general, and we must bear in mind also that the rolled-rim bowl probably persisted in the Cyclades through the Troy I period: certainly many of the Troy I bowl shapes are not seen.

There seems little to connect Crete with Anatolia at this time. The Pyrgos pattern burnish, despite a superficial resemblance with that of Beşikatepe is probably of later date than Anatolian examples. The beginning of Early Minoan I thus cannot be fixed in relation to Troy I. It seems that the Grotta-Pelos culture began during the time of Kum Tepe Ib and runs parallel to Troy I. The Eutresis culture, following Eutresis Group II, probably began about the time of Troy I.

This brief discussion allows the Anatolian sequence to be tied in with that of the rest of the Aegean. The results are seen in the chronological table, Table 13.4.

THESSALY AND MACEDONIA

Thessaly and Macedonia both show, at the beginning of the early bronze age, the same very general resemblances which are seen elsewhere. The plain burnished bowls

with incurving rims are related to those of Troy I, and there are other general similarities. The clay anchors, as already mentioned, seem to be without clear-cut chronological significance. At Sitagroi they appear in considerable numbers in phase V.

The Aegean maritime contacts, so common in the later early bronze age between the other regions of the Aegean, seem to be lacking. The Tiryns culture sherd at Kritsana VI is the only evident import from the south Aegean from the entire early bronze age. Thessaly and Macedonia do not participate in the increasing cultural contacts.

The cultures of these regions are to be dated by contact with their immediate neighbours: Thessaly with south Greece, and east Macedonia with Troy. Radiocarbon dates will soon be of help in resolving these problems of dating, and if the excavations at Sitagroi were supplemented by further work in early bronze age levels in southern Thessaly, a solid framework might well emerge. But at present there is little which these regions can contribute towards the general understanding of the chronology of the southern Aegean.

Cross-Dating of the Aegean with Historical Chronologies

Aegean chronology in the early bronze age has traditionally been based on relations with the ancient civilisations, themselves calendrically dated. In particular the contacts between Crete and Egypt have been of paramount importance. The tenuous nature of such contacts has made possible wide variations in the chronology: the beginning of Troy I, for instance, has been dated by serious scholars to anywhere between 3500 and 1700 BC (Mellaart 1962, 43; Åberg 1932, 104, 123–58 and 163). The Early Minoan I period, to take another example, has been variously dated as follows:

- 3400–2800 BC (Evans 1921–35, I, 70)
- 2900–2700 BC (Pendlebury 1939, 300)
- 2600–2400 BC (Matz, quoted Hutchinson 1962, 138)
- 2500–2400 BC (Hutchinson 1962, 138)
- 2400–2250 BC (Hood 1961)

In 1961, when the first comprehensive list of radiocarbon dates from the Aegean was published by Kohler and Ralph, a new approach became possible. The discrepancies between the radiocarbon dates for Egypt and the Near East, however, understandably gave rise to misgivings, and there were some disturbing inconsistencies. By 1964, using the longer half-life for radiocarbon (5730 years), some reconciliation was possible (Renfrew 1964, 127). But not until the calibration of radiocarbon dates by tree-ring chronology was there hope of a clearer solution.

Although the dendrochronological calibration has not yet been assimilated to archaeology, and cannot be considered firmly established, it does in fact allow a solution of nearly all the outstanding problems. As an experiment it is systematically applied in

the next section, and the resulting correspondence between historical and radiocarbon dates is sufficiently close for an integrated chronology to be put forward.

CRETE AT THE END OF THE EARLY BRONZE AGE

The earliest recognisably Cretan finds in the east Mediterranean are of Middle Minoan II, or perhaps Middle Minoan Ib, date. From this time onwards the absolute chronology of the Aegean is closely documented by true cross-datings (Aegean finds dated in the Near East, dated Near Eastern and Egyptian finds in Crete and Mycenae) and has been surveyed recently by Stubbings (Hayes, Rowton and Stubbings 1962).

The Treasure of Tod, apparently accumulated during the reign of the 12th Dynasty pharaoh Amenemhet II contained metal vessels plausibly regarded as Middle Minoan IIA imports from Crete (Kantor 1965, 21). Hood has, however, suggested (1963, 94) on the basis of comparison with recent Knossos finds, that the Tod cups may rather, if they are Minoan, belong to the Middle Minoan Ib phase. (These Knossos cups were from the same level as the Middle Cycladic jug cited above (pl. 13, 2), so that the Tod treasure is referable also to the Second City at Phylakopi.) There are problems concerning this treasure; but on the face of it we have Middle Minoan IIA or Middle Minoan Ib imports in Egypt before the death of Amenemhet II, around 1900 BC, following the widely accepted Egyptian chronology (Hayes, Rowton and Stubbings 1962, 4). Previously the earliest context for the import of Middle Minoan IIA pottery was set (not altogether securely) in the reign of Amenemhet II's son Sesostri II by finds of pottery at Harageh, and by finds of Middle Minoan II pottery at Abydos and Kahun (Smith 1945, 3; Kantor 1954, 11–13; Pendlebury 1939, 144–45). Commenting on the implications of the Tod treasure, Albright (1954, 33) suggests that while Kamares ware may be imitating designs on metalwork seen at Tod, 'If the use of these fluted designs continued generations after the attestation of them at Tod, it is perfectly possible that Middle Minoan II did not begin for a good century after the Tod deposit was made. There is no proof Kamares ware was imported into Egypt until the last decades of the Twelfth Dynasty.' Since the 12th Dynasty is generally dated from 1991 to 1786 BC, Middle Minoan II on this basis might be set nearer 1800 than 1700 BC.

On the basis of these pottery finds (but without the Tod data) Pendlebury (1939, 146) assigned a span of from c. 2000 to c. 1875 BC for the Middle Minoan IIA period. He then put Middle Minoan I at c. 2200 to c. 2000 BC (These dates rested partly, however, on an exaggeratedly early dating for the 1st Dynasty of Babylon). If, following Hood's suggestion, the Tod cups are of Middle Minoan Ib form, Middle Minoan Ib designs had reached Egypt by 1900 BC. The Middle Minoan I period could well have begun before 2000 BC as Pendlebury suggested.

The other component of the cross-dating, however, must be the evidence in Crete itself. Several Egyptian objects from Middle Minoan contexts have long been known, among the best stratified being a 12th Dynasty scarab and a scarab of the First Intermediate pe-

riod, together with Middle Minoan I pottery at Gournais (*ibid.*, 120). Two recent finds are important. At Knossos, an imported Egyptian scarab of the late 12th or early 13th Dynasty type was found in Middle Minoan IIb deposits (Hood 1963, 96 and pl. A). Its manufacture may be dated to about 1750 BC. At Lebena, in levels of the Middle Minoan Ia period, three Egyptian scarabs assignable to the 12th Dynasty were found: the deposit must thus have remained open after 1991 BC (Alexiou 1963, 91).

These finds are supplemented by the much discussed finds of Tholos B at Platanos, where among Minoan objects accompanying burials over a considerable period, imported Egyptian scarabs and a Near Eastern cylinder seal were found. The chronological significance of these finds has been considered by many scholars. Unfortunately, since there was no reliable stratigraphy at Platanos, these finds cannot be given a very precise position in the Minoan periodic sequence. The chronological range of the burials is, however, known: they began in the Early Minoan II period, and the latest finds have generally been attributed to Middle Minoan Ia (Smith 1945, 10). Branigan has recently shown, however, that some of the burial goods must be assigned to the Middle Minoan Ib/Ila period (Branigan 1968c, 22–24).

The Egyptian scarabs were discussed in detail by Smith and the latest of them was set late in the 12th or early in the 13th Dynasty. A more recent discussion has reached a similar conclusion (Robinson in Branigan 1968c, 12–28). Since the 13th Dynasty began in 1786 BC, it seems that Tholos B at Platanos was still in use at about that date.

The cylinder seal offers an independent line of approach. Most scholars have agreed to assign it to the time of Hammurabi of Babylon (Smith 1945, 15), but more recent work suggests that it may be up to 100 years earlier (Robinson in Branigan 1968c, 29). The high dating for Hammurabi ('about 2100 BC') followed by Evans and Pendlebury has now been almost universally rejected, and his accession is now set at around 1800 BC (Smith, 1945, 17; Hayes, Rowton and Stubbings 1962, 42). It thus seems that this cylinder seal may have been buried some time during the 19th century BC.

This discussion shows clearly how uncertain must be a dating on this evidence. If the Tod evidence be accepted (and the vases may well not be actual imports from Crete), then Middle Minoan Ib or Middle Minoan Ila influence was seen in Egypt by 1900 BC. The ceramic evidence in Egypt makes it clear that Middle Minoan II pottery was imported by 1800 BC. This might lead us to put Middle Minoan Ib from c. 2000 to c. 1900 or 1850 BC, and Middle Minoan Ila from c. 1850 to 1800 BC.

The Lebena scarabs suggest that Middle Minoan Ia is not likely to have ended until c. 1950 BC at the earliest. If the end of Middle Minoan Ib were set between 1850 and 1800 BC, the evidence of the Platanos finds (accepting Branigan's extension of the Minoan range there) would be reconciled.

The Egyptian evidence at present suggests a slightly earlier dating than the Cretan. A range for Middle Minoan Ib of c. 1950 to c. 1850 BC is perhaps in best accord with the evidence. Middle Minoan Ia will then have begun between 2100 and 2000 BC.

These conclusions accord well with those of Hutchinson (1962, 127), and indeed follow essentially the same reasoning. Åström has marshalled the arguments for a later

dating—but even if the scarabs at Platanos do belong to the 13th Dynasty (and were thus buried at the earliest around 1750 BC) a Middle Minoan IIA date could be suggested for their burial. Clearly both the date of these scarabs (which, rather than the Babylonian cylinder, argue for a low dating) and the acceptance of some of the pottery at Platanos as Middle Minoan Ib/Middle Minoan II are crucial. Åström, however, relies heavily on radiocarbon evidence which, without dendrochronological calibration, does indeed favour a low dating. We shall see below that the work of Suess and others has completely transformed this line of approach. Åström suggested first 1900, then 1800 BC for the beginning of Middle Minoan Ia. It now seems that 2000 BC is the latest acceptable date, and 2100 BC may be preferable.

THE EARLY MINOAN PERIOD

Stratified imports in Crete are much rarer during the early bronze age, and no Early Minoan exports have been found in historically dated contexts in the Near East. Finds of ivory, presumably Syrian or Egyptian, are numerous in Early Minoan contexts and foreign influences are perhaps reflected in the designs of the sealstones. But their inadequate stratigraphic position reduces the value of such observation.

The sole body of evidence of any plausible validity is the series of Egyptian late Predynastic and Early Dynastic vases found, generally in rather unsatisfactory contexts, at Knossos. Pendlebury was very properly cautious about their chronological value (1939, 54–55, 74, 90). Recently they have been authoritatively considered by Warren, who lists 32 Egyptian vases found in Crete which can be set between the Predynastic and First Intermediate periods (1965, 28 f.). Only three were found in contexts which in Crete may plausibly correspond to their Egyptian dates, the others being in contexts obviously considerably later. A diorite pyxis of the 6th Dynasty or earlier was found in the Aghia Triadha *tholos* in a context there between Early Minoan II and Middle Minoan II, and two bowl fragments came from the upper level of a late neolithic house below the Central Court at Knossos. These two bowls are datable, if Egyptian, to the Predynastic or Early Dynastic I or II periods (Evans 1921–35, II, 16 and 7a and 7c; Warren 1965, 30, nos. 5 and 13). Warren suggests that the upper level of this house is in fact of Early Minoan I date, since a Pyrgos chalice was found there, but such an occurrence is less surprising if a smooth transition from final neolithic to Early Minoan be accepted. A further bowl of syenite, of the 3rd Dynasty, supposedly found in a ‘sub-neolithic’ context at the South Propylaeon at Knossos has been considered significant by some authors, but Warren emphasises that in fact it lacks any stratigraphical context at all (1965, 30, nos. 6 and 36).

The stratified evidence thus documents:

- (a) That Middle Minoan II did not end before the 6th Dynasty of Egypt (hardly a revolutionary conclusion); and that Early Minoan II probably did not end much

after that time (2423 to 2263 BC), if one assumes that the bowl at Aghia Triadha was buried within a few years of its manufacture.

- (b) The Early Minoan I period at Knossos did not begin before the date of manufacture of the two bowls ('if Egyptian') found at Knossos. A possible date for the end of the Second Dynasty is 2686 BC (Hayes, Rowton and Stubbings 1962, 5) and its date could in fact be set much earlier. This still leaves an unsatisfactorily wide range for the beginning of Early Minoan I.

No fewer than 11 of these early Egyptian vases are found in late contexts in Crete, chiefly Late Minoan I contexts, which demonstrates merely that they continued to be prized: an Egyptian vase in the Treasury of St Mark's in Venice underlines this point. Many of them were found in unstratified deposits at Knossos, probably as a result of the levelling of the Early Minoan levels there before the construction of the palace. The time range for most of them, in Egyptian terms, is Predynastic to 6th Dynasty. If we assume that they arrived in Crete not too long after their manufacture, as Warren urges, they were arriving in Crete from between c. 3100 to about 2200 BC. This perhaps suggests an order of magnitude date for the end of the neolithic and for the Early Minoan period. But regrettably there is no precision in this.

The Cretan evidence thus suggests that the Middle Minoan period began between approximately 2100 and 2000 BC. The beginning of the Early Minoan period may perhaps be about a millennium earlier.

THE MAINLAND AND ISLANDS

So far there is no material for the early bronze age of the Greek mainland which provides a reliable cross-dating with the early civilisations. The pendant from Asine (Frödin and Persson 1938, 239 f.) now to be placed within the span of the Korakou culture, has indeed similarities with the chlorite schist vessels of the Keros-Syros culture and of Early Minoan II. There seems no reason, however, to search for more distant parallels.

From the Cyclades a single cylinder seal with an unusual suspension loop attracts notice. It is a unique find, and comes from Amorgos together with other objects assignable to the Keros-Syros culture, and perhaps late in its duration (pl. 23, 2; Renfrew 1967a, 6 and pl. 4, 19). Frankfort (1939, 70 and 301) classed this seal as of Jemdet Nasr date on account of the 'loop-bore' suspension, setting it as early as 3000 BC. But this early date is disputed by Kenna (personal communication; cf. Buchanan 1960, no. 741), and a later one seems more appropriate. In any case there is not sufficient precision to cast much light upon Cycladic chronology.

Two seals from Poliochni have attracted attention. The first from Poliochni V (Yellow), contemporary with Troy II, is of ivory (Brea 1957, figs. 1 and 25), and has a similar suspension loop to the Cycladic one (pl. 23, 3). It has no close parallel in the Near East.

The second is a seal impression, possibly from the Green phase at Poliochni, and attributed by the excavators to an Egyptian origin between the times of the 5th and 8th Dynasties (*ibid.*, 653). But Kenna does not accept this attribution (personal communication) and feels that the object (which does not in fact appear to be an impression, but simply an incised motif) might be of Anatolian origin and considerably earlier. In any case, Brea himself has emphasised its unreliable stratigraphic position,² and no importance can be attached to it.

WESTERN ANATOLIA

The absolute chronology of western Anatolia has been the subject of controversy. Since no direct imports from the Near East have been recognised at Troy or elsewhere, other related sites nearer Mesopotamia must be taken as chronological intermediaries.

There are only two chains of chronological links to consider: via Cappadocia to the Near Eastern chronological system, and via Cilicia to the Levant. The Cappadocian link with Alishar, and these with Troy, have been discussed by Mellaart (1957, 55 f.) They do not seem conclusive in themselves, and rely heavily on the Cilician interrelations, which are in dispute. The basic problem is to decide how to correlate the Trojan early bronze age periods (Troy I, Troy II, Troy III–V) with the sequence at Tarsus.

There is a good measure of agreement about the absolute chronology of Tarsus. Finds of Syrian pottery, datable to Amuq period H came from the Early Bronze I and II levels at Tarsus (Mellink 1965, 110), and bottles like those of Early Bronze II Tarsus have been found in the Early Dynastic cemetery at Ur. Moreover there are connections with Egypt: a Cilician Early Bronze II jug was found at Giza in a context dated to the time of the 4th Dynasty pharaoh Cheops around 2575 BC. A seal from Early Bronze III Tarsus (*ibid.*, 111) can be set in the first Intermediate period (c. 2180 to 2040 BC).

The disagreement arises over the relationship between Troy and Tarsus, and the difficulties in correlating the two areas may be seen from the conflicting equations set out in Table 13.4.

There are undoubted resemblances in the shapes of Troy II and Early Bronze III Tarsus. Mellink (1965, 115) cites the *depas* (Troy form A45), the plate or platter (Troy A1) and the plain wheel-made bowl (Troy A2). These shapes are not found in Troy I, or at Early Bronze II Tarsus.

Mellaart's view (1967, 69) is that people from Troy II introduced their culture to Cilicia towards the end of the Troy II period, thus establishing the Early Bronze III culture at Tarsus, while Mellink thinks of a flow of ideas or influences in the other direction: 'The wheel-made bowls of A2 type are more easily explained as a Cilician fashion which found its way to Troy than vice versa.'

2 Brea 1964, 651: 'è molto singolare e lascia alquante perplessi, soprattutto sulla reale appartenenze del pezzo agli strati (in realtà superficiali) da cui proviene, nei quali potrebbe anche rappresentare una intrusione superiore.'

It should be noted that initially Mellaart set the beginning of Cilician Early Bronze III contemporary with middle Troy II (Troy IIc) while more recently he has set it at the beginning of the Troy III period.

TABLE 13.4 Alternative synchronisms for early bronze age Tarsus and Troy.

<i>Tarsus</i>	<i>Troy</i> (Mellaart 1962, 44)	<i>Troy</i> (Mellaart 1957, 73)	<i>Troy</i> (Mellink 1965, 126)
Early Bronze IIIb	Troy IV	Troy IV	Troy III and IV
EB IIIa	Troy III	Troy IIc–g and III	Troy II
EB II	Troy II	Troy II a and b	Troy I
EB I	Troy I	Troy I	Kum Tepe

The present writer does not feel able to adjudicate on this matter. It will be seen below, however, that the radiocarbon dates can be interpreted as supporting the Troy II/Cilician Early Bronze II equation. But this does not necessarily lead to the very early date for Troy I which Mellaart would propose. In any case the uncertainties in relating the Troy chronology with that of the Near East are so great that the synchronisms add little to what we have already learnt from Crete.

Radiocarbon Dates and Absolute Chronology

The rather inadequate cross-dating for the Aegean early bronze age has fortunately been supplemented by a series of radiocarbon dates. These form a coherent group, but their correlation with the historic chronology—like that of all radiocarbon dates for the third millennium—presents certain problems.

Many of these difficulties are resolved by the dendrochronological calibration of radiocarbon dates. This allows us to set up a new chronology for the Aegean, using the historic correlations only for purposes of comparison. Such a chronology must at present be tentative, dependent as it is on the still incomplete calibrations. But the striking complementarity of the historic and radiocarbon chronologies indicated below suggests that it should be correct in outline.

The principles upon which the calibration rests have been outlined by Suess (1967), and its implications have been set out tentatively for Europe as a whole (Renfrew 1968a; 1970b; 1970c; Neustupný 1968). The calibration chart which has been used here is seen in fig. 13.2. Since it is itself only a preliminary calibration, the calibrated dates themselves must be used with extreme caution. The improved harmony between the his-

torical and radiocarbon dates for Egypt which it brings encourages the hope that the emerging chronological pattern will be correct in outline.

The radiocarbon dates for the early, middle and late neolithic of the Aegean fall comfortably before 3000 BC in radiocarbon years, and they need not be considered here. Table 13.5 lists the available radiocarbon dates which bear upon the chronology of the

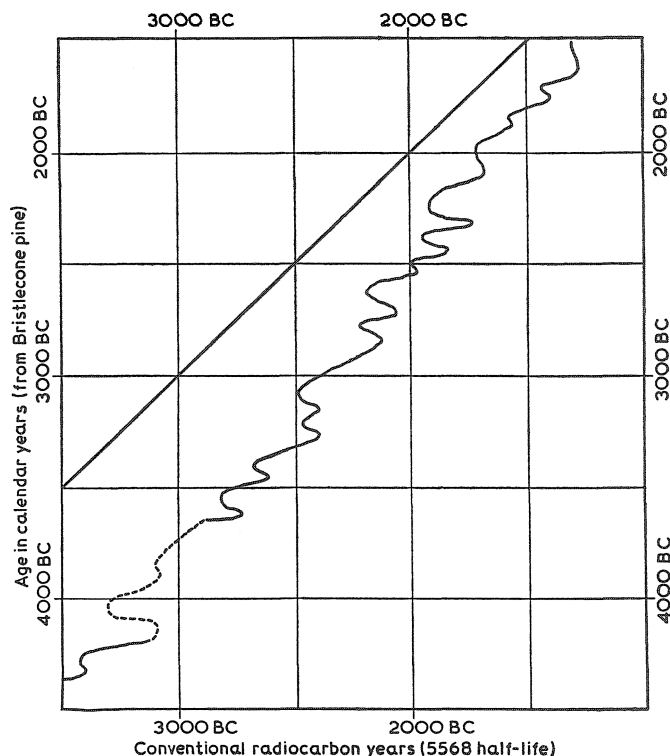


FIG. 13.2 Calibration chart used for the conversion of radiocarbon dates to dates in calendar years (based on work by Suess).

Aegean early bronze age. Unfortunately the dates for Thessaly and Macedonia cannot yet be related with confidence to those of the southern Aegean, but the series from mainland Greece appears to give a satisfactory coherent picture.

The radiocarbon dates listed in Table 13.5 are shown again in fig. 13.3. The time scale, of course, is in radiocarbon years and a range of one standard deviation has been shown for each date. From this figure emerges an approximate range in radiocarbon years for the sequence in southern Greece.

The implication of these radiocarbon dates, after calibration by means of the curve seen in fig. 13.2, have been applied to the relative chronology between the different regions of the Aegean which was established in preceding sections. The relative and absolute chronologies can be reconciled in a satisfactory manner, and the result is seen

TABLE 13.5 Aegean radiocarbon dates (half-life 5568 years).

No.	Site	Phase	Date BC	Lab. No.
1	cave, (unspecified)	Cretan Final Neo.	2550 ± 300	Sa 241
2	Myrtos	Early Minoan II	2192 ± 80	Q-953
3	"	"	1855 ± 85	Q-950
4	"	"	1785 ± 80	Q-951
5	Phaistos	Middle Minoan	1525 ± 120	Pi-15
6	Palaikastro	Middle Minoan III	1500 ± 75	St-1265
7	Kephala	Cycladic Final Neo.	2876 ± 56	P-1280
8	Eutresis	Eutresis culture	2496 ± 69	P-306
9	"	"	2492 ± 57	P-307
10	"	Korakou culture	2262 ± 56	P-317
11	Lerna	"	2120 ± 65	P-3 18
12	"	"	2031 ± 64	P-321A
13	"	"	2027 ± 59	P-319
14	"	"	1946 ± 58	P-321
15	"	"	1887 ± 65	P-312
16	"	Korakou/Tiryns culture	1978 ± 58	P-320
17	"	Tiryns culture	1919 ± 53	P-300
18	"	"	1803 ± 93	P-299
19	"	Middle Helladic	1798 ± 108	P-303A
20	"	"	1568 ± 51	P-303
21	Sitagroi IV	Macedonian Final Neo.	2440 ± 100	Bln-773
22	"	"	2360 ± 100	Bln-782
23	Sitagroi Vb	Macedonian EBA	2135 ± 150	Bln-781
24	"	"	1920 ± 100	Bln-780
25	Argissa	'Early Thessalian III'	2110 ± 80	GrN-4144
26	"	"	2010 ± 60	GrN-4471
27	"	Middle Thessalian	2050 ± 70	GrN-4143
28	"	"	1790 ± 35	GrN-3740
29	Emborio IV	Troy I	2025 ± 92	P-273
30	Beycesultan XXXVI	Late Chalcolithic	3014 ± 50	P-298
31	Beycesultan XXVIII	"	2740 ± 54	P-297
32	Karataş	Late Troy I period	2324 ± 62	P-920
33	"	"	2278 ± 62	P-923
34	"	"	2271 ± 61	P-917
35	"	"	2188 ± 62	P-921
36	"	"	2180 ± 61	P-918
37	"	"	2176 ± 60	P-919

in Table 13.6. The radiocarbon chronology for the various periods is entered in the left margin of the table, dates being based on the 5568 half-life for radiocarbon. In the right margin is the suggested periodisation in calendar years, based on the tree ring calibration. Since the calibration remains imprecise in detail, these dates are at present very approximate.

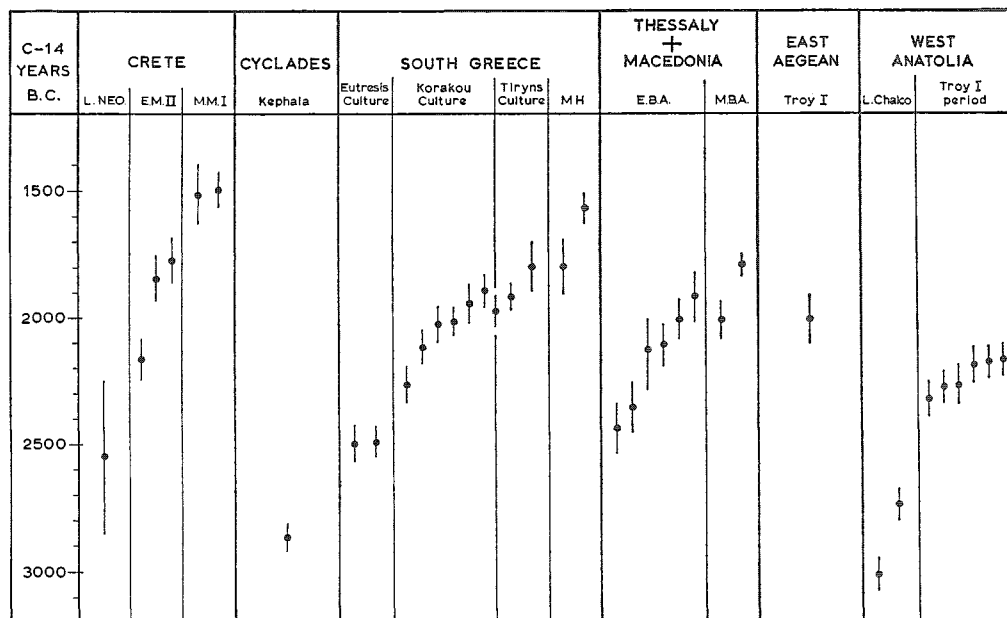


FIG. 13.3 Aegean radiocarbon dates for the third millennium BC, indicating the standard deviation for each date. The dates (on the 5568 half-life) are listed in table 13.5.

A calibrated date for the early bronze age/middle bronze age transition of c. 2100 BC is in accord with the radiocarbon date of about 1800 BC. The date for the inception of the Tiryns culture (and Phylakopi I) is more difficult to define since the radiocarbon calibration curve is very irregular in this region. A calendar date of c. 2400 to 2300 BC is suggested.

The beginning of the Korakou culture has been set at c. 2700 BC in calendar years, a date taken also for the beginning of the Early Minoan II and Keros-Syros cultures. Troy II may begin a century or so later, sometime after 2600 BC. This allows us to refer the Karataş dates, set by Mellink late in the Troy I period (although this is disputed by Mellaart), to around the beginning of Troy II.

The beginning of the Eutresis culture is hypothetically set at around 3200 BC. The Grotta-Pelos culture will already have begun by then, and the Kum Tepe Ib culture is still under way. The beginning of Troy I may be set around 3100 BC. To date the beginning of Early Minoan I is rather difficult—perhaps it began at about the same time.

The periods suggested here conform satisfactorily to the radiocarbon dates. For the mainland series, only P-317, for the Korakou culture, a date in calendar years of about 2900 BC, seems rather too early, and this by only a couple of centuries.

Even the much-discussed date for Emborio IV on Chios, now c. 2450 to c. 2300 BC in calendar years, falls within the span of the Troy II period. As discussed above, the persistence in Chios of the Troy I culture, perhaps with a few additional elements, well into

the Troy II period seems plausible. The Thessalian dates seem at present rather high: as explained above, this may be due to difficulties in correlating the Thessalian sequence with that of southern Greece.

The radiocarbon chronology harmonises adequately with the chief historical links discussed, namely:

- (i) An origin for Middle Minoan Ia of c. 2100 BC.
- (ii) An origin for Early Minoan I very approximately around 3200 BC.
- (iii) The equation of Early Bronze II Tarsus and Troy II at about 2600 BC.

The links which Mellaart (1960) proposed, in an article full of penetrating insights, between Troy I and the Balkan chalcolithic are not here accepted. It has been argued that the Gumelnitsa culture was over before Troy I began (Renfrew 1969b). Radiocarbon dates for the Cernavoda-Ezero culture (which follows Gumelnitsa) of 2555, 2435 and 2310 BC (Bln-61a, 61 and 62) give a calibrated mean of c. 3200 BC in calendar years, and support this conclusion. The contemporaneity of the corded ware in Tiryns culture contexts with early corded ware in the Balkans is supported by radiocarbon dates for Ochre Graves at Baia Hamangia in Romania. These are 2140 and 2110 BC (Bln-29 and Kn-38). A radiocarbon date of 2580 BC (GrN-1995), for a sample from the same grave as Bln-29 has not been taken into account) giving a date in calendar years of c. 2600 BC, some two centuries before the beginning of the Tiryns culture.

Table 13.6 embodies the results of this discussion. Taken in conjunction with Table 5.1 for the neolithic period and Table 9.6 for the individual Cycladic islands, it gives for the areas in question what should be a broadly coherent statement of the chronological position. Its compilation fulfils the objectives of Part I of the present work. A discussion of what was really happening during the various periods in question is reserved for Part II.

TABLE 13.6 Chronology of the Aegean in the third millennium BC (Radiocarbon dates on the 5568 half-life; calendar date based partly on the Suess [1967] calibration of radiocarbon).

C-14 DATE B.C.	CRETE	CYCLADES	MAINLAND	NW ANATOLIA	CALENDAR DATE B.C.
M.B.A. —c1800	MM Ia	Phyl. II	MH	Troy IV	c2100/2000
E.B.3 —c1900	"EM III"	Phyl. I	Tiryns	Troy III-V	c2400/2300
E.B.2 —c2200	EM II	Keros-Syros	Korakou	Troy II	c.2700
E.B.1 —c2500	EMI	Grotta-Pelos	Eutresis	Troy I	c.3200
FINAL NEO.	"sub neo"	Kephala	Eutresis Gp. II	Kum Tepe Ib	

PART II

Culture Process



Chapter 14

Patterns of Settlement and Population

in the Prehistoric Aegean

The preceding chapters, of Part I, have established the culture sequence in the various regions of the Aegean during the third millennium BC. This was a crucial period, as reviewed in Chapter 4, for the evolution of Aegean civilisation. The task now, in Part II of the present work, is to gain some insight into how and why these various developments occurred.

The model presented in Chapters 1 to 3 is useful here. The third millennium Aegean is divided into cultures, each with its own territory—Crete, Cyclades, south Greece, etc. Each culture may be regarded as a system whose units are the persons, artefacts and elements of the environment, related by the activities of the members of the culture. The different fields of action—subsistence, technology, social, projective—define the subsystems. In succeeding chapters each of these subsystems will be considered in turn, the subsistence subsystem of all the regions in one chapter, the social subsystems in another, and so forth.

In terms of this model, the human population of the Aegean does not constitute a subsystem in itself. It is a parameter, a relevant statistic of all the subsystems. Obviously it reflects the absolute size of the culture systems in terms of individuals, and population density influences all the subsystems of the culture. But the population itself does not define for us the different patterns of activity in the various fields or dimensions of human existence. And it is these activities in the different fields which determine the nature of the subsystems.

The settlement pattern, likewise, while itself a fundamental aspect of the culture, is not in this sense a system or a subsystem. It documents where and how the various activities are carried out: it is a symptom.

Precisely because population is a fundamental parameter of all the subsystems which constitute a society, and settlement pattern an obvious record and symptom of so many activities, their study must form the starting point for any investigation of a prehistoric culture or society. They are considered here as a preliminary to the discussion of the various subsystems, undertaken in succeeding chapters.

Settlement patterning obviously constitutes a major source of information for prehistorians. Yet despite the use which archaeologists have long made of distribution maps, and their growing awareness of environmental factors, a consideration in quantitative terms is still a rarity.

The limitations imposed by the material are obvious, and in the past have doubtless inhibited quantitative considerations. Several factors must be borne in mind (Renfrew 1971) including the destruction of and failure to recognise certain classes of site, and the varying intensity of archaeological research in different areas.

Locational analysis applied to prehistoric material differs from applications to recent material first by the various uncertainties in the relationship between the original or 'true' population at a given time, and the sample in hand. Secondly the analysis is generally diachronic, it has time depth—sometimes confusingly so, since there is no guarantee that sites of a given period or culture, even permanent habitation sites, were in fact occupied at the same time.

Despite these limitations, order of magnitude comparisons of some plausibility can be made, sometimes on a quantitative basis. In general a comparison of the data between the periods or areas may reduce rather than increase the errors. For the uncertainties discussed are not random ones, and the factors governing preservation and detection for the different sites are correlated, and may continue to hold for different regions or different time periods.

Several aspects of prehistoric settlement in the Aegean will be considered in turn:

1. Settlement density in the different regions of the Aegean.
2. Patterns of settlement increase in selected regions.
3. Development of settlement size from the neolithic to the late bronze age.
4. Continuity and discontinuity of settlement occupation.
5. Population density and size in the various regions.
6. Settlement location and settlement hierarchy.

Recent systematic and intensive site surveys in different regions have made the Aegean one of the most comprehensively surveyed areas in the world. No evaluation of the results has yet been undertaken, perhaps because all those who have themselves surveyed the sites know how very incomplete and haphazard is the picture we now have of the prehistoric settlement pattern. And yet, although an attempted analysis may seem premature, certain broad, order-of-magnitude results emerge. They suggest, in turn, further lines of approach.

Settlement Density in the Different Regions of the Aegean

Remains of the neolithic period in Greece were first intensively investigated in Thessaly. The *maghoulas* (tell mounds) there were clearly prosperous and long-lived settlements in the neolithic period. The work of Tsountas (1908) and of Wace and Thompson (1912)

was followed by comparable studies in Macedonia (Heurtley 1939). And although neolithic sites are known in plenty in southern Greece and in Crete and more sparingly in the islands and west Anatolia, only rarely—at Knossos or Hagiorgitika—do they achieve there a sufficient depth of deposit to be considered tells.

At first sight this might suggest that the fertile plains of Thessaly and Macedonia were more intensively settled than southern Greece, and the sites occupied for longer periods. This is not necessarily so, since tell formation depends as much on the use of mud brick or pisé in construction as on prolonged occupation. Stone materials were easier to re-use, and the rate of deposition in stone-built settlements consequently much slower. None the less, the depth of deposit of neolithic levels on open sites (hence excluding caves) seems a meaningful criterion for long-lived permanent habitation sites of this particular type. Fig. 14.1 shows the distribution of open sites in the Aegean where more than 2 m of neolithic deposits have been found. Except in a few cases (Dhimitra, Megalokambos) this information is available only for excavated sites, so that the distribution is in part a reflection of recent archaeological activity and not solely of prehistoric settlement density. The map may contain some errors, and certainly some omissions, and does not pretend to reflect settlement density at a given point in time. Despite these limitations, it clearly indicates that neolithic tell settlement in the Aegean is most densely concentrated in the fertile plains of Thessaly and Macedonia. This conclusion is in conformity with the distribution of tell settlement in south-eastern Europe as a whole: tells are generally restricted to fertile lowland plains.

Contrasting markedly with the distribution of neolithic tell settlements is that of the Mycenaean and Minoan settlements of the late bronze age, which is dense in southern Greece and the islands and very sparse in the north. To plot the totality of known Minoan and Mycenaean sites of the late bronze age would be misleading, since this would exclude much of northern Greece, where there is plenty of evidence for late bronze age occupation, but only sparse indications of Mycenaean activity. Our interest here, however, is the emergence of civilisation, and there is no doubt that the distribution of such 'civilised' features as palaces, built stone tombs, and stone fortification walls is a southerly one. Fig. 14.1 therefore shows the Aegean late bronze age distribution of palaces, villas, megarons and fortified strongholds, following Hope Simpson (1965) and Graham (1962), with a few additions.

This map again makes no claim to be complete, but despite omissions a very clear picture emerges. Aegean civilisation was a feature of the southern Aegean, especially Crete and the Peloponnese, although it extended north as far as Thessaly, east to the Dodecanese, and to Kephallenia in the west. A similar definition of the extent of Minoan-Mycenaean civilisation is yielded by the distribution of late bronze age *tholos* tombs (fig. 4.2). The settlement in Macedonia and Thrace, although indeed fairly dense in the late bronze age, may not have differed significantly in type from that of the late neolithic period. Recent work in the Plain of Drama in Macedonia does, however, indicate a shift there in the later bronze age from tell settlement to the occupation of defensible sites on low hills, of which at least one was fortified. So far this observation has

not been repeated in other areas of north Greece, but it suggests caution in making too sharp a distinction between north and south Greece in the later bronze age.

This general pattern can already be seen in embryo during the early bronze age. Stone fortifications became widespread at this time, although seen first during the neolithic at Dhimini in the then flourishing Thessalian region. And while there are no palaces and few impressive built tombs in the early bronze age, the development of cemeteries, and of burial techniques beyond that of simple inhumation in the soil (the burials often accompanied with rich grave goods) heralds the more monumental features of

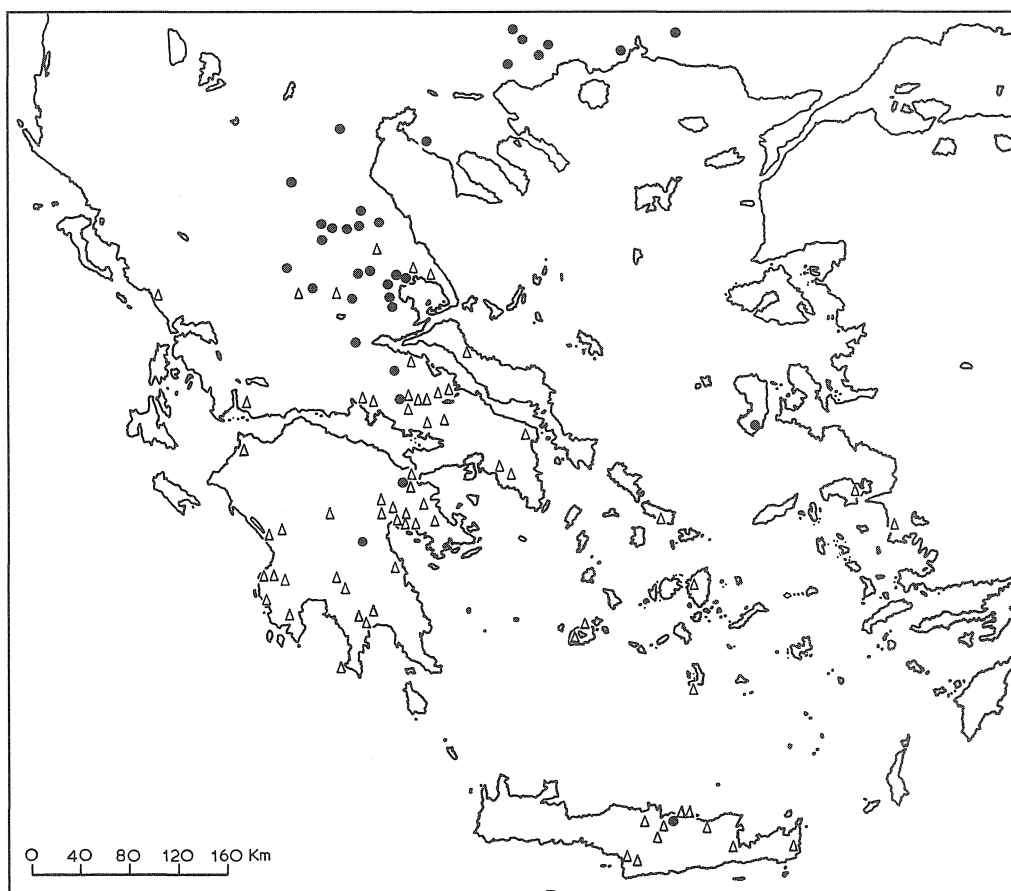


FIG. 14.1 The contrasting distribution of neolithic tell mounds and of major late bronze age sites in the Aegean. The late bronze age sites comprise all those listed by Hope Simpson (1965, 195) under the headings palaces, megara, fortresses, together with those classed by Graham (1962) as palaces or villas (with the addition of Zakros in Crete, Akrotiri in Thera and Akroterion Gurion in Tenos). The neolithic tell mounds are those which have yielded more than two metres of stratified deposit; many unexcavated mounds are therefore excluded (see notes to the figures).

late bronze age funerary custom. Fig. 18.12 shows the known stone-fortified sites of the Aegean early bronze age, together with the principal cemetery sites. Some of the Cycladic cemeteries (which are seen in full on fig. Appx. 1.2) are omitted for convenience, and the representation of Yortan cemeteries in north-west Anatolia is not complete. Cave burials in Crete are omitted.

These three maps say nothing of intensity or size of settlement. They do indicate how a new distribution of a different kind emerged during the early bronze age and was consolidated during the late bronze age. The stability of this configuration is documented by its persistence to the early 'archaic' period of the classical Greek civilisation.

These are distributions by settlement type—tells as against palaces, cemeteries and so forth. They do not yield information about the density of settlement in different regions. An approach to this question, although a very inadequate one of uncertain validity, is to consider the distribution maps given by Weinberg (1965a) for his three periods of neolithic settlement in Greece (the late neolithic including also the final neolithic as defined here in Chapter 5). Weinberg's maps give an excellent picture of current knowledge, but inevitably a figure for the density of settlement reflects first the intensity of the search. A count of the neolithic settlements shown on these maps for the different regions of Greece is given in Table 14.1.

TABLE 14.1 The apparent density of settlement of neolithic and Minoan-Mycenaean sites in the different regions of Greece, calculated on the basis of recent surveys. (The figures are not, however, strictly comparable, in view of the different intensity of survey in the different regions.)

<i>Region</i>	<i>Macedonia and Thrace</i>	<i>Thessaly</i>	<i>Central Greece</i>	<i>Peloponnese</i>	<i>North-west Greece</i>	<i>Crete</i>	<i>Aegean islands</i>	<i>Total</i>
E. Neo sites	2	6	16	14	0	2	2	41
M. Neo sites	3	23	17	18	2	3	0	66
L. Neo sites	27	27	39	20	3	28	3	147
Min-Myc sites	(20)	73	157	308	42	182	50	832
Cultivated area (thousands of sq km)	12.1	4.8	6.2	6.1	3.2	3.2	2.1	37.4
No. of L. Neo sites per thousand sq km	2.2	5.6	6.3	3.3	0.9	8.8	1.4	33.9
No. of Min-Myc sites per thousand sq km	(1.7)	15.2	25.2	50.5	13.1	56.9	23.8	22.9

For the purposes of crude comparison a similar count of Minoan and Mycenaean sites is given, compiled from the lists of Hope Simpson (1965) and from Pendlebury's map (1939, 284). The figure for Macedonia and Thrace is artificially low for the late bronze age, since sites in this area lack Mycenaean remains. Figures for the area of land cultivated in each region in 1961 (Ethniki Statistiki Yperesseia 1962a) allow the approximate comparison of the observed settlement densities. (North-west Greece here com-

prises the Ionian islands, Aetolia, Acarnania and Epirus; central Greece here includes Attica and Euboea.)

These figures possibly reflect as much as anything the intensity of survey work in pre-historic Crete. Crete remains, indeed, the only one of these regions for which a comprehensive survey has been published. French's recent survey in central Macedonia (1967a), which has in a single stroke increased the number of known sites by more than 50 per cent, documents the great extent to which these figures reflect the intensity of archaeological exploration.

TABLE 14.2 The various regions of Greece arranged in rank order in terms of observed settlement density, for later neolithic and Minoan-Mycenaean sites.

<i>Rank order</i>	1	2	3	4	5	6	7
Later neolithic	Crete	Central Greece	Thessaly	Peloponnese	Macedonia & Thrace	Aegean islands	North-west Greece
Mycenaean period	Crete	Peloponnese	Central Greece	Aegean islands	Thessaly	North-west Greece	Macedonia & Thrace

None the less it is worth contrasting the rank order of regions in terms of the observed settlement densities, for the later neolithic and for Minoan-Mycenaean settlements.

Crete retains its pre-eminence. Central Greece, Thessaly and Macedonia and Thrace decline in rank order over the period in question. On the other hand the Peloponnese, the Aegean Islands and north-west Greece go up in rank order.

However unreliable these results may be, established as they are on the basis of observed settlement density, they certainly correlate rather well with those obtained above for settlement type. It is precisely those regions where tell settlement is most notable in the neolithic period which have declined in relative importance by the late bronze age. The tell distribution is seen on figs. 14.1 and 15.2; the relevant geographical areas are named in fig. 20.5.

The contrast between the various regions are further discussed in the next section, and correlated with the vegetation zones in the next chapter.

Patterns of Settlement Increase

Comparisons of settlement density for several areas are much more difficult than comparisons of settlement size or even of settlement type. For the number of sites recovered is very closely proportional to the intensity of survey, while the size of sites and even the variety in type of site should emerge gradually as exploration proceeds. For that reason

the settlement densities expressed in Table 14.1 can have little real meaning: they represent the state of our knowledge rather than of prehistoric settlement.

On the other hand, within a given region, the period-by-period *comparison* of the density of known sites should be far less dependent upon the intensity of exploration. Since site surveys normally yield material of all prehistoric periods, a biased search for sites of one period will none the less yield sites of all cultural phases. The principal bias here is introduced when different types of site were occupied preferentially in different periods. Tells and acropolis sites, for instance, are notoriously easy to discover, and in consequence most surveys will favour the periods when they were occupied. And again, in the Cyclades the early bronze age practice of burial in cist graves undoubtedly ensures that a high proportion of the prehistoric cemeteries originally utilised are in fact recovered (just as tumuli and kurgans make obvious the cemeteries of central and northern Europe). Periods when such burial customs are in operation are thus disproportionately favoured.

None the less, the most appropriate procedure for the comparison of settlement densities would seem to be the period-by-period comparison of occupations within designated areas. We can then primarily compare not the absolute densities of settlement in the various regions but rather the patterns of change which are revealed in the different regions.

It should be noted, of course, that sites may not have been occupied throughout the length of the specific period divisions used (neolithic, middle bronze age, etc.). The settlement density as given by the totality of recorded sites occupied during the period thus yields a maximum figure. The relative length of the periods is clearly also a factor here, since a high score of recorded settlements during a short period division (such as the middle bronze age) is more remarkable than over a longer time span.

Table 14.3 is based upon the various site surveys in the Aegean which have been made in recent years. The regions surveyed are Crete, the Cycladic islands, Messenia, Laconia, Euboia and Macedonia: their boundaries are indicated on fig. 20.5. The figures for Euboia are from the summary list given by Sackett, Hankey, Howell, Jacobson and Popham (1967, 111), those for Laconia from the table by Waterhouse and Hope Simpson (1961, 164), and for the south-west Peloponnese from the list given by McDonald and Hope Simpson (1969, 161) which conveniently summarises their earlier work. The figures for central Macedonia¹ are based on French's recent review (1967a) taken in conjunction with the information given by Heurtley (1939, xxii–xxiii). In each case, most identifications classed as doubtful have been accepted. The Cycladic figures are based upon the survey reported in the Gazetteer in this volume, together with unpublished survey findings for the middle and late bronze age which supplement the work of Scholes (1956). The figures for Crete are based upon the surveys of Pendlebury (1939), Hood (1965b; 1967) and Hood, Warren and Cadogan (1964), which have been inte-

¹ Central Macedonia comprises the *nomes* of Emathia, Thessaloniki, Killis and Pella. The sites of Toumba Paionas and Evropos of French's survey are excluded here as lying outside the region.

grated in a useful unpublished paper by Miss Elizabeth Hemingway (1969). The areas quoted are for the total land surface (*Ethniki Statistiki Yperesseia* 1962a, 2–5.)

The figures at a given period for one region are not necessarily comparable with those for another region, but the patterns of growth, of period-by-period change, are of the highest interest. When the number of settlements recorded per 1,000 sq km of land is plotted for each region and period, notable divergences between the regions emerge.

TABLE 14.3 Period-by-period comparison of observed settlement densities in selected regions of Greece. (The figure for the early bronze age Cyclades excludes locations known exclusively through cemeteries; the total, including such cemeteries, is given in brackets. The figure in brackets for the neolithic of Euboea excludes sites recognised solely on the basis of obsidian finds.)

<i>Region, and total land area (sq km)</i>	<i>Number of sites, and number of sites per thousand sq km</i>				
	<i>Neo.</i>	<i>EBA</i>	<i>MBA</i>	<i>LBA</i>	<i>Total</i>
Crete	42	111	190	284	379
8190	5.1	13.6	23.2	34.7	46.2
Cyclades	10	51 (127)	18	32	82 (158)
2490	4.0	20.5 (50.9)	7.2	12.9	33.0 (63.8)
Messenia	17	34	105	198	211
2870	5.9	11.9	36.6	69.0	73.6
Laconia	10	39	25	56	59
3530	2.8	11.1	7.1	15.9	16.7
Euboea	28 (16)	54	34	49	82 (79)
3560	7.8 (4.5)	15.2	9.5	13.8	23.0
Central Macedonia	36	47	29	61	84
12800	2.8	3.7	2.3	4.8	6.6

The number of settlements is plotted on a logarithmic scale in fig. 14.2, and some allowance for the duration of periods is made on the time axis. The number of settlements in each case denotes the total recognised over the period in question: it does not follow that all the sites attributed to a given period were occupied simultaneously.

The first and most important feature displayed by this graph is that two growth patterns are seen for the settlements of prehistoric Greece. In two regions, Crete and Messenia, the increase is seen as approximately a straight line. This pattern of growth we may term pattern A. In the three other regions of southern Greece studied, the curve has two peaks, this pattern of growth we may term pattern B (fig. 14.3).

Pattern A, a straight line on a logarithmic scale, approximates to an exponential increase in the number of settlements. This implies a natural and uninhibited growth, without severe restraints imposed, for instance, by very limited food supplies, or other constraining factors. Such patterns of settlement and population growth are familiar in

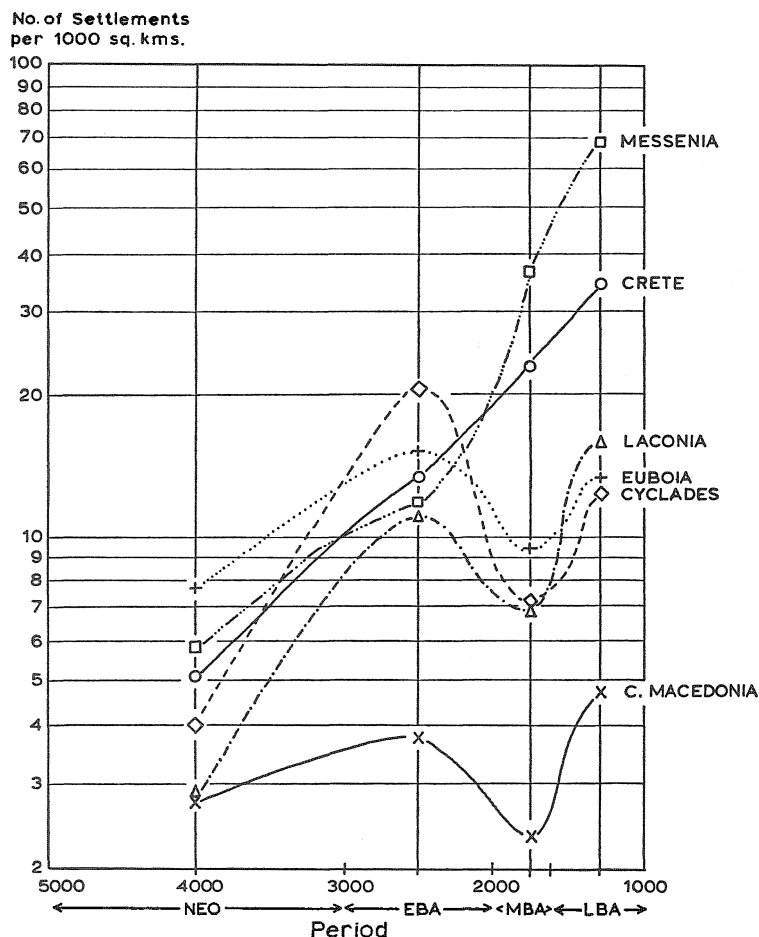


FIG. 14.2 The growth in number of settlements in different areas of the prehistoric Aegean, on the basis of recent site surveys (see Table 14.3).

many parts of the world at different times. Viewed in these terms the growth of settlement may be seen as a natural one, without striking discontinuity.

Pattern B indicates a severe decline in the number of settlements recorded for the middle bronze age. This may be in part due to the shorter duration of that period. And we shall see, in a later section, that while the number of settlements may have been smaller, their individual size may have increased. No decline in human population is necessarily implied, although the growth rate certainly diminished. The recognition of these two differing growth patterns suggests the operation of significant and perhaps identifiable factors in the growth of settlement and population in the prehistoric Aegean.

A consideration of the growth rates over the time range neolithic to early bronze age, and neolithic to late bronze age, is also instructive (Table 14.4).

We see, for instance, that the number of settlements in early bronze age Crete was greater by a factor of 2.6 than in the neolithic period. These figures give a graphic indication of the rapid expansion which was taking place in some regions during the neolithic to early bronze age transition. The diagram, fig. 14.4, contrasts the growth in settlements in the selected regions over the two time ranges in question.

TABLE 14.4 Growth factors from neolithic to early bronze age, and from neolithic to late bronze age, for selected regions in Greece. The survey figures for each period, from which these are calculated, are given in Table 14.3.

Region	Crete	Cyclades	Messenia	Laconia	Euboia	Central Macedonia
Growth factor, Neo to EBA	2.6	5.1 (12.7)	2.0	3.9	1.9 (3.4)	1.3
Growth factor Neo to LBA	6.8	3.2	11.6	5.6	1.8 (3.1)	1.7

The most striking feature of these diagrams is the high growth factor for all the regions of south Greece, over the time span neolithic to early bronze age. The number of settlements in every region increases by a factor of between 2 and 6. But in the one region of north Greece under consideration, central Macedonia, the factor is only 1.3. The distinction between north Greece and south Greece, already indicated in the previous section, is most clearly seen here. It was evidently during the neolithic/early bronze age period that factors came into operation which served to differentiate between settlement densities of northern and southern Greece.

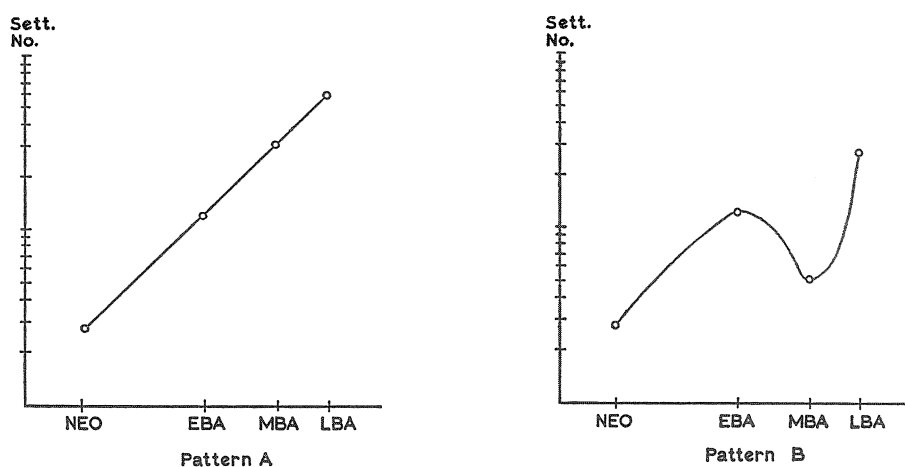


FIG. 14.3 Patterns of growth: two different growth patterns for settlement numbers in the prehistoric Aegean. Pattern A (left): exponential growth (Messenia and Crete); Pattern B (right): retarded exponential growth (Laconia, Euboia, Cyclades).

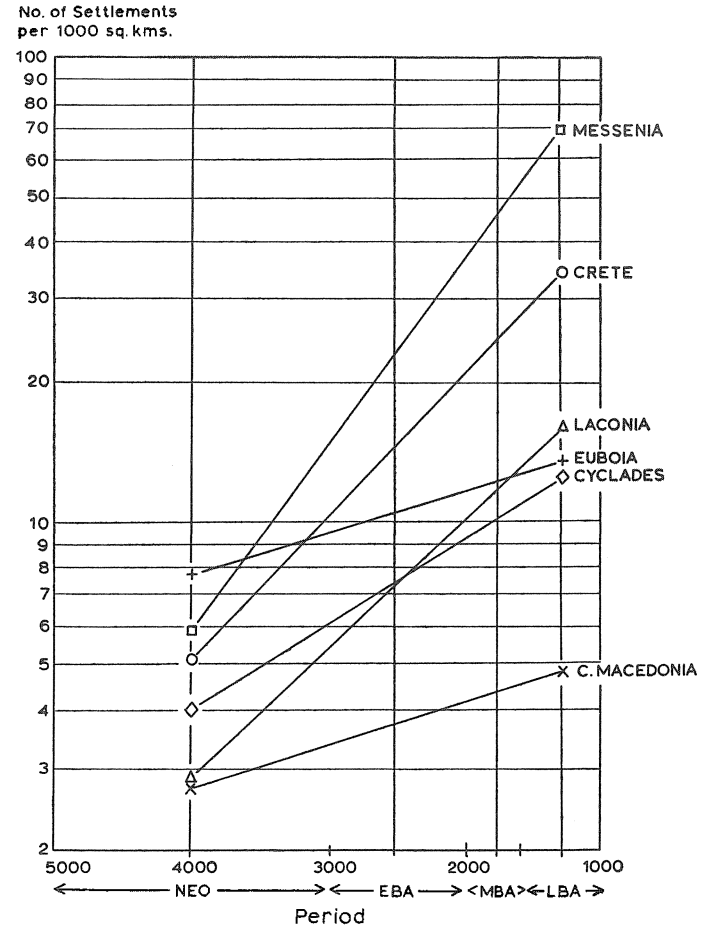
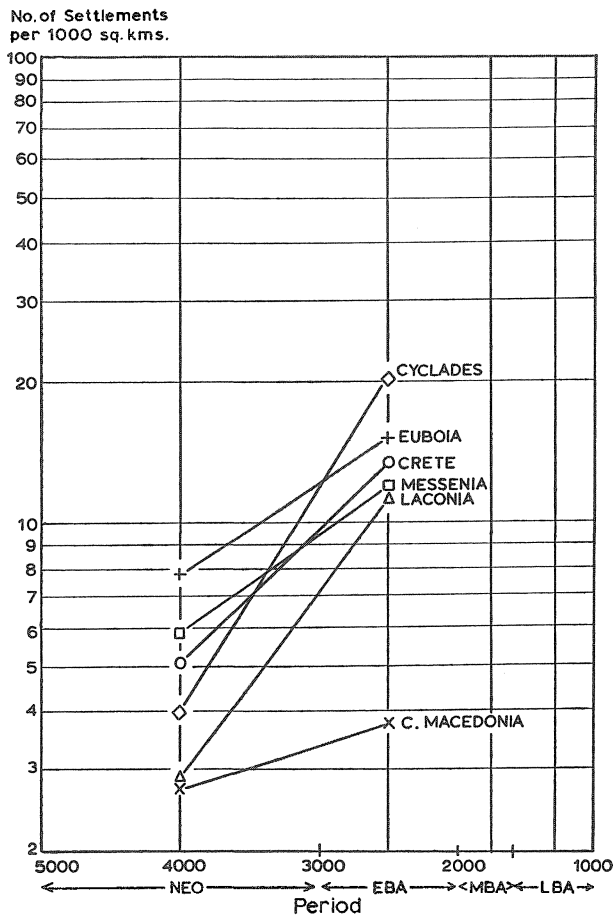


FIG. 14.4 Comparison of growth in settlement numbers in the prehistoric Aegean:

(a) neolithic to early bronze age;

(b) neolithic to late bronze age.

The distinction is sustained when the neolithic/late bronze age growth factors are considered, although Euboea has a much lower average growth than the other regions of south Greece. (This may in part be attributed to the exaggeration in the number of neolithic sites recorded in the survey of this region, where 12 sites were classed as neolithic on the basis solely of finds of obsidian and without the corroborative evidence of pottery.) But the Cyclades and Euboea fall back now from their previous leading position. This underlines the suggestion made above that special factors came into play at the end of (or during) the early bronze age which inhibited or negated the multiplication of settlements in these regions.

To recapitulate then, certain fundamental conclusions may be drawn from this analysis:

1. Two very different growth patterns are obtained for settlements in the prehistoric Aegean, patterns A and B.
2. Pattern A presents a picture of exponential growth in settlement numbers.
3. Pattern B shows an increase severely inhibited in the early bronze age/middle bronze age period.
4. A distinction is drawn between north Greece, where growth is slow throughout, and south Greece, where growth is rapid from the early bronze age onwards.
5. The growth inhibition in early bronze age/middle bronze age times, as reflected in the late bronze age figures, is most marked in the Cyclades and Euboea.

Settlement Size

Few prehistoric Aegean settlements have been excavated in their entirety. But an estimate of the size of the settlement, that is to say the occupied areas, is often possible, which can at least be used as a basis for order-of-magnitude comparisons.

In Table 14.5, the total area of several prehistoric settlements is listed. Obviously there need be no direct correlation with the population of the settlements. Moreover, for several sites, marked with an asterisk, the estimate is based on the total area of the settlement, usually of a tell mound, which was occupied over a considerable period. At any one time the occupied area may have been much less. In the settled areas, the density of population undoubtedly varied. Within the limits of a settlement such as Late Helladic Eutresis (213,000 sq m within the circuit walls) large areas might be without habitation, leaving only a reduced area with buildings (35,000 sq m; Goldman 1931, 68) and no reliable estimate of the occupied area can be made without total excavation.

These figures are based upon approximate estimates for the area of settlements, calculated directly from the plans published by the excavators. Although very approximate, they should have an order-of-magnitude validity. These figures are seen diagrammatically in fig. 14.5. The tell mounds, whose settlement area at a specific time is uncertain, and the colossal and largely empty areas enclosed by the walls at two Mycenaean sites, are indicated by broken lines. It should be noted, on the other hand, that the areas for

TABLE 14.5 Estimated approximate area of settlement for several major Aegean prehistoric sites. (Asterisks denote sites where the area actually occupied at a given time was probably less than the observed area of settlement.)

Site	Area: sq m	Source and comments
<i>Neolithic (Phases II and III)</i>		
Saliagos	3,700	Plan: area of island
Sesklo	4,000	Plan
Dhimini	4,900	Plan
Sitagroi	7,500	Plan: estimated area of mound occupied in period III.
Argissa	*17,500	Plan: total area of mound
Nea Nikomedeia	*18,000	Plan: total area of mound
<i>Early Bronze Age (Phase IV)</i>		
Panormos (kastro)	500	Plan
Myrtos	1,250	Excavator (Dr P. M. Warren, personal communication)
Chalandriani Kastro	3,600	Plan
Thermi	4,500	Plan
Askitario	5,000	Plan
Zygouries	*6,200	Plan: total area of mound
Troy II	10,000	Plan
Phylakopi I	10,800	Plan
Poliochni V (yellow)	15,000	Plan
Lerna	*21,600	Plan: total area of mound
Korakou	*22,500	Plan: total area of mound
<i>Middle Bronze Age (Phases IV–V)</i>		
Malthi	9,800	Plan
Knossos palace	13,000	Plan: palace only
Troy VI	20,000	Plan
<i>Late Bronze Age (Phases V–VI)</i>		
Zakro palace	3,600	Plan: incompletely excavated
Pylos palace	7,000	Plan: palace only
Mallia palace	7,500	Plan: palace only
Aghia Irini	7,500	Plan
Phaistos palace	8,100	Plan
Pylos settlement	12,600	Plan: area within walls
Knossos palace	13,000	Plan
Gournia	15,000	Plan of town
Phylakopi III	18,000	Plan of town
Tiryns	22,000	Area within walls
Athens Acropolis	25,000	Area within walls
Gla, palace enclosure	31,000	Plan
Eutresis, settlement	35,000	Excavator: Goldman 1931, 68
Mycenae, citadel	38,500	Plan
Lefkandi	*45,000	Plan: total area of mound
Eutresis, within walls	*213,000	Excavator: Goldman 1931, 68
Gla, within walls	*235,000	Plan

the major late bronze age Minoan settlements are given in some cases by the area of the palace itself. The total settlement area was undoubtedly somewhat larger, but the area of the surrounding buildings is difficult to estimate.

Neolithic village settlement elsewhere in Europe are of comparable size to the Aegean neolithic settlements. For example the early neolithic village of Tell Azmak in Bulgaria has an area of 5,500 sq m; Chotnitsa and Căscioarele (fig. 5.1), of the later neolithic Gumelnitsa culture, of 4,000 and 4,800 sq m respectively; Köln-Lindenthal of the Danubian I culture, 7,500 sq m; and Habașești of the Tripolye culture, 15,000 sq m.

The total areas of the tells of Argissa and Nea Nikomedeia would stand out on the diagram as exceptional if they were taken to represent the total settled area at a given time; perhaps something like half the total was settled at once.

We may then suggest a typical neolithic village size in the Aegean in the range 4,000 to 8,000 sq m, reaching 10,000 sq m (1 hectare, i.e. c. 2½ acres) at times, and rarely perhaps more.

The most striking feature of the early bronze age settlement size is that it is not very notably greater. Once again the total area of tells like Lerna and Korakou may be misleading: perhaps half the total area would represent settlement at a given time. The little forts of Panormos and Chalandriani (fig. 11.4) are perhaps deceptive in the opposite sense, since the main settlement was outside of them. Myrtos (Phournou Koriphi) is a very compact, densely occupied village (fig. 6.5). The proto-urban 'towns' of the early bronze age Aegean thus range from 4,500 sq m at Thermi (fig. 8.4) to 15,000 sq m at Poliochni. So that while the larger towns are perhaps twice the size of a neolithic village, the smaller ones do not differ from their predecessors in terms of size. These early bronze age 'towns' are less than 2 ha in area.

The palaces of the middle and late bronze age are not strikingly large: the palace at Zakro is the same size as an average neolithic village; that at Knossos compares with the earlier 'town' at Poliochni. Of course the Cretan palaces did not stand alone: at Knossos an interesting series of smaller villas and 'palaces' has been excavated, and blocks of houses at Mallia. In no case, however, has the surrounding area been adequately investigated, and Gournia alone gives a good impression of a Minoan town (15,000 sq m). Grandiose estimates have been made for the town at Knossos. Hutchinson (1950, 206) quotes a possible population of 100,000. Using Frankfort's estimate (1950, 103) of population density in a Sumerian city of 400 persons per hectare, this would lead to an area of settlement of 2,500,000 sq m (2½ sq km). This exceeds the entire Knossos region by a factor of 10 and cannot be accepted as realistic. The palace and fortified enclosure at Pylos may give a firmer indication, where the palace occupies about half the total area enclosed by the walls. Probably the settled area at Knossos did not exceed 30,000 to 50,000 sq m: greater than the town at Phylakopi, and comparable with the area of settlement at Mycenae or Tiryns. The relatively small size of the entire settlement at Pylos or Aghia Irini in Kea indicates that a palace settlement complex did not need to be much greater than one hectare in area.

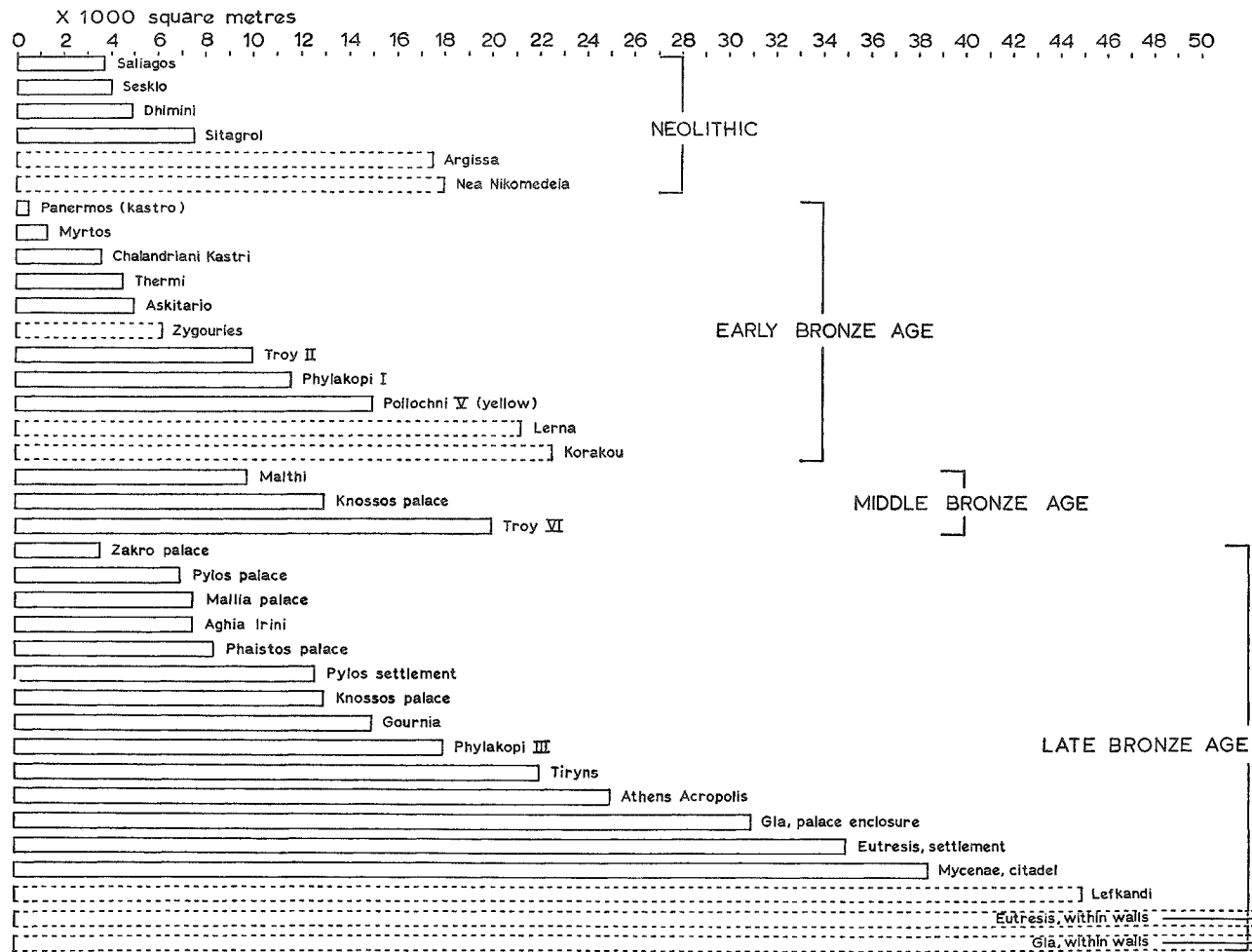


FIG. 14.5 The increase in the size of prehistoric Aegean settlements. Approximate settlement area is indicated (cf. Table 14.5). (Tell settlements whose settled area at anyone time may have been less than the measured area are indicated by dotted lines; only part of the space within the walls at Gla and Eutresis was actually settled.)

We may set the size range of a typical late bronze age Aegean major settlement as from 10,000 to 40,000 sq m.

To appreciate the significance of this rather slow growth in size, whereby the area of settlement from neolithic village to late bronze age town increases by a factor of only 10, comparison with the Near East is useful. In the following list (Table 14.6) the areas of a number of Near Eastern settlements, from early neolithic to Early Dynastic times, are given. As before, it does not follow that the entire area within the settlement was oc-

TABLE 14.6 Estimated approximate areas of settlement for several early Near Eastern sites. (Asterisks denote sites where the area actually occupied at a given time was probably less than the area of settlement.)

<i>Site</i>	<i>Area: sq m</i>	<i>Source and comments</i>
<i>Neolithic / Chalcolithic</i>		
Jarmo	*10,000	Plan
Ali Kosh	*14,000	Plan
Tepe Sabz	*11,200	Plan
Hacılar	*18,700	Plan
Can Hasan	*75,000	Estimated from excavator's measurements, French 1962, 27
Çatal Hüyük	*120,000	Plan
<i>Predynastic</i>		
Uqair	70,000	Quoted by Hole 1966, 607
<i>Early Dynastic/Bronze Age</i>		
MBA Jericho	38,000	Plan
Beycesultan	*60,000	Plan
Khafaje	400,000	Quoted, Hole 1966, 607
Ur	600,000	Quoted, Hole 1966, 607
Uruk	4,500,000	Plan

cupied, nor is population necessarily proportional to area. Once again, tell sites, where the total area is given rather than the area occupied at a given time, are indicated by an asterisk.

These figures may usefully be considered in the light of the size-definitions for village, small town, and large town, formulated by Adams (1965, 39) for Early Dynastic sites in the Lower Diyala region of Mesopotamia. 'Large towns' are defined as 'more than 10 hectares in area', 'small towns' as '4-10 hectares in area', and 'villages' as 'less than 4 hectares in area'. On this scale middle bronze age Jericho and Beycesultan have the areas of small towns, while Ur and Khafaje are very properly large towns in terms of size. Uruk, the largest of the Sumerian cities is, of course, vast in this context (4½ sq km), bigger than Republican Rome, and twice the area of Themistoclean Athens.

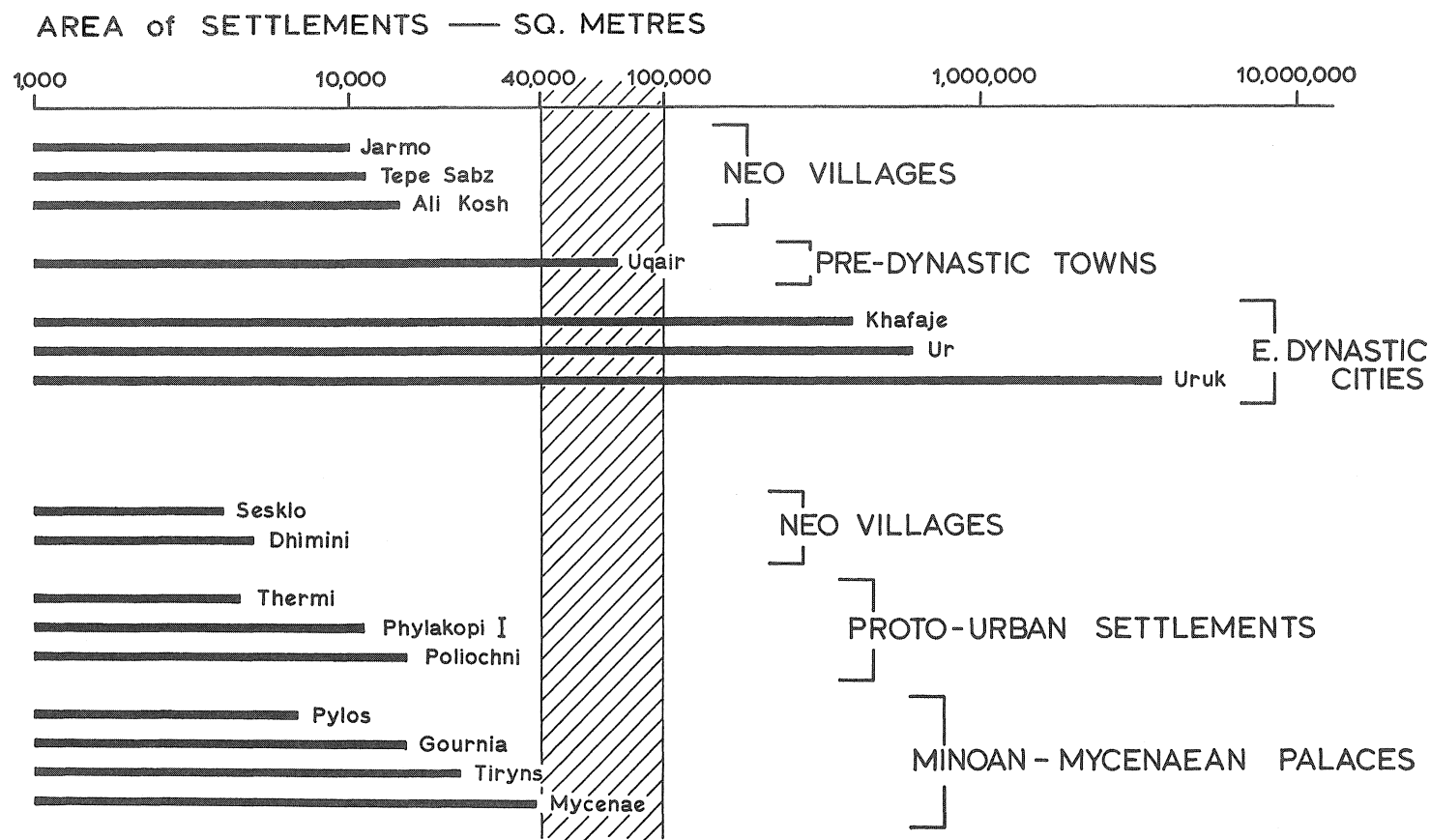


FIG. 14.6 Comparison of settlement size in the prehistoric Aegean and Near East. Note the limited growth in the Aegean, where irrigation was not practised (cf. Table 14.6).

Size is not, of course, on its own a valid criterion for towns or cities, and a consideration in terms of function (cf. Chapter 18) is also necessary. Function, variety and specialisation cannot, however, be determined archaeologically without extensive excavation, and the only possible comparative procedure open to the archaeologist is the consideration in terms of settlement area.

In Early Dynastic terms, Predynastic Uqair and the tell of chalcolithic Can Hasan have the areas of small towns; neolithic Çatal Hüyük that of a large town. The other neolithic sites listed are fair-sized villages. We should notice that a large town in Mesopotamia is a hundred times the size of a small village.

These figures permit a general comparison of the growth in size of the Aegean settlements with those of their Near Eastern counterparts. Some of the Aegean settlements are compared, at the same scale, with Uruk in fig. 14.8. Figure 14.6 compares the size development of the Near Eastern sites considered with the developmental pattern established in fig. 14.5 for the Aegean. The Anatolian sites (Çatal Hüyük, Hacilar, Can Hasan and Beycesultan) are not shown, but the exceptionally large size, for a neolithic site, of Çatal Hüyük must be noted. The scale for the areas is now a logarithmic one. The shaded arms indicates the size range suggested by Adams for 'small towns' in Early Dynastic Mesopotamia.

The important conclusion is that typical Aegean prehistoric settlements did not exceed in area a total of 4 hectares (40,000 sq m), the figure which in Early Dynastic Mesopotamia marks the upper size limit of a village.

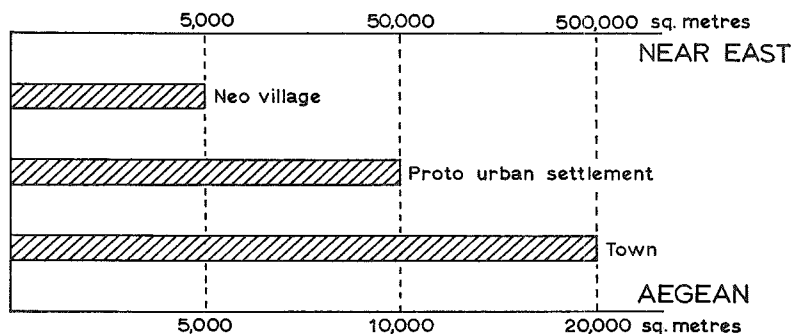


FIG. 14.7 Diagrammatic simplification of settlement growth in the Aegean and the Near East. The neolithic villages in both regions were of comparable size, and in both regions the growth was exponential—in the Near East to the base 10, in the Aegean to the base 2.

Naturally there may be exceptions (although the walls of Gla and Eutresis, as explained above, can reasonably be discounted for the present purpose). In Crete, the existence of an urban agglomeration around two of the palaces has been suggested, and the region at Knossos, believed by Evans (1921–35) to encompass the Minoan town is shown in fig. 14.8. Hood's map of the Knossos region would suggest an area of about 500,000 sq m for the urban settlement, and the supposed town of Mallia has been as-

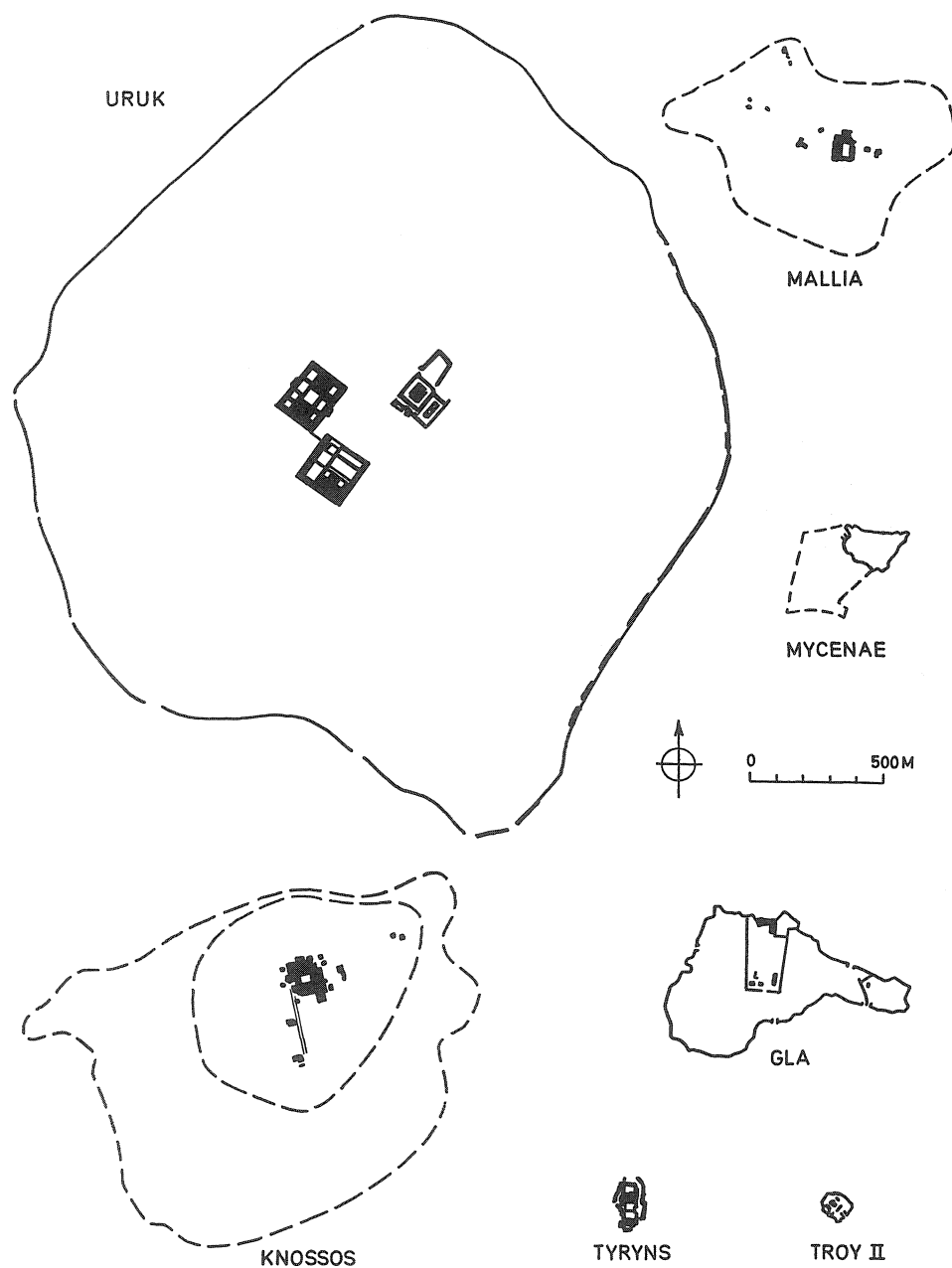


FIG. 14.8 Early Aegean sites compared with Early Dynastic Uruk, all at the same scale. The clotted lines indicate the extent of the 'lower town' at Mycenae, the supposed area of settlement around the palace of Mallia, and the 'inner town' and 'outer town' around the palace of Knossos, as indicated by Evans. (It is doubtful whether the areas of settlement at Mallia and Knossos were in fact so large.) Most of the area within the walls at Uruk was densely occupied.

signed a slightly smaller area (Demargne and Callet de Santerre 1953, pl. 1). But the evidence for dense occupation within these areas is not convincing, and even Knossos and Mallia are scarcely comparable to an Early Dynastic Sumerian town.

In the Near East, before 5000 BC, Çatal Hüyük had already gone beyond village or 'small town' scale, equalling the size of the 'large towns'. In general, however, the larger neolithic settlements of the Near East are still 'villages', of area up to 4 ha, the larger predynastic settlements 'small towns' up to 10 ha, and the larger Early Dynastic settlements 'large towns' of up to 1 sq km in area. The larger Minoan-Mycenaean towns were no larger than a fair-sized village of Early Dynastic Mesopotamia.

The growth factor in the Aegean was thus much smaller than in the Near East. Both areas nurtured small early neolithic villages, of comparable size. But the proto-urban settlements of the Near East were some ten times greater in area than these early villages, and the large Early Dynastic towns about ten times larger again. In the Aegean these increases take place with a ratio of two, not of ten.

The point is most succinctly expressed in the diagram, fig. 14.7, which brings out one of the fundamental differences between Aegean civilisation and the 'irrigation civilisation' of the Near East. In both cases the scale is logarithmic, for the Near East to the base 10, for the Aegean to the base 2.

We may note in passing that the Indus civilisation cities of Mohenjo-Daro (670,000 sq m) and Harappa (350,000 sq m) are of the same order of size as their Mesopotamian contemporaries.

McDonald and Hope Simpson (1969, 175) have rightly written: 'If urbanisation requires (among other features) a really sizeable concentration of population at urban centres, it is questionable whether the term can properly be applied to Mycenaean civilisation at any stage.' This fundamental point, documented above, must always be in our minds if we are to avoid the trap of supposing that the origin of the Aegean civilisations is essentially analogous to those of Mesopotamia or of Mexico. Their scale was not the same.

A comparison of some leading Aegean prehistoric settlements with the major Sumerian city of Uruk is given in fig. 14.8. Nothing could more emphatically illustrate dangers of equating the Minoan-Mycenaean civilisation with Mesopotamia.

The typical Aegean early bronze age settlement was indeed larger than its neolithic predecessors—perhaps covering 10,000 sq m now instead of 5,000 sq m. And the Minoan-Mycenaean palace settlements were larger again, typically of 20,000 sq m. This growth in size is an important factor for the understanding of Aegean civilisation, but far from a dominant one, as it may have been in the Near East.

Settlement Continuity

The site survey data already used can also yield information about the continuity of settlements. Again, one region may not be comparable with another, but the period-by-

period comparison within a given region is of interest. The basic data, from the same sources used for Table 14.3, are given in Table 14.7.

There are various ways by which these data may be analysed. To the best of my knowledge the question of continuity has never previously been considered on a detailed quantitative basis. Yet it is highly relevant to the whole question of transferences of population, with consequent discontinuity of occupation. Once again there are several cautionary factors. In the first instance the presence of finds of neolithic, early bronze age, middle bronze age, and late bronze age data at a site does not necessarily imply

TABLE 14.7 Continuity in the occupation of settlement sites from one period to the succeeding period. The table shows the number of sites in each period which are newly occupied (i.e. not known to have been occupied in the previous period), and the number with continuity of occupation. The percentages indicate in each case, first the percentage of sites of the previous period which remain in occupation, and secondly the percentage of sites in the period in question which are newly occupied. The final total is the total number of prehistoric sites recorded in the area in question.

	Neo	EBA			MBA			LBA			Total
		From Neo	New	Total sites	From EBA	New	Total Sites	From MBA	New	Total Sites	
Crete	42	3	80	111	68	122	190	127	157	284	379
%		73.9	72.2		61.2	64.3		66.9	55.3		
Cyclades	10	3	48 (124)	51 (127)	12	6	18	11	21	32	82 (158)
%		30.0	94.1		23.6	33.3		61.2	65.6		
Messenia	17	8	26	34	21	84	105	96	102	198	211
%		47.1	76.5		61.7	80.0		91.4	51.5		
Laconia	10	7	32	39	20	5	25	25	31	56	59
%		70.0	82.2		51.3	20.0		100.0	55.3		
Euboia	28 (16)	20 (9)	34	54	26	8	31	28	21	49	82
%		71.4	63.0		48.1	23.5		82.4	42.8		
Central Macedonia	36	17	30	47	24	5	29	28	33	61	84
%		47.2	63.8		51.1	17.3		96.6	54.1		

continuity of occupation throughout the period in question, since each of these chronological divisions was itself of long duration. The absence of finds from many sites on the other hand, does not document abandonment, since excavation is necessary to establish the *absence* of material representative of a given period. Surface collection alone is insufficient.

Two sets of histograms for each area are seen in fig. 14.9. The first set indicates the percentage of sites in the period that continue in occupation into the next. The second shows the percentage of settlements in each period which were not settled (or at least have not produced evidence for settlement) in the previous period. This then gives the proportion of new sites in each period.

If, for example, we consider the early bronze age/middle bronze age transition in Crete, we see that 61 per cent of Early Minoan sites were still in use in the Middle Minoan period (these sites constituting 36 per cent of the total sites in the Middle Minoan period). 64 per cent of Middle Minoan sites are new.

We see then that in general, from one period to the next, there is at first sight a fairly high continuity. With the exception of the Cyclades, between 47 per cent and 74 per cent of neolithic sites continued to the early bronze age, and between 48 per cent and 62 per cent from the early bronze age to the middle bronze age. We may note that the figure of 61 per cent for Crete (Early Minoan to Middle Minoan) where the actual ar-

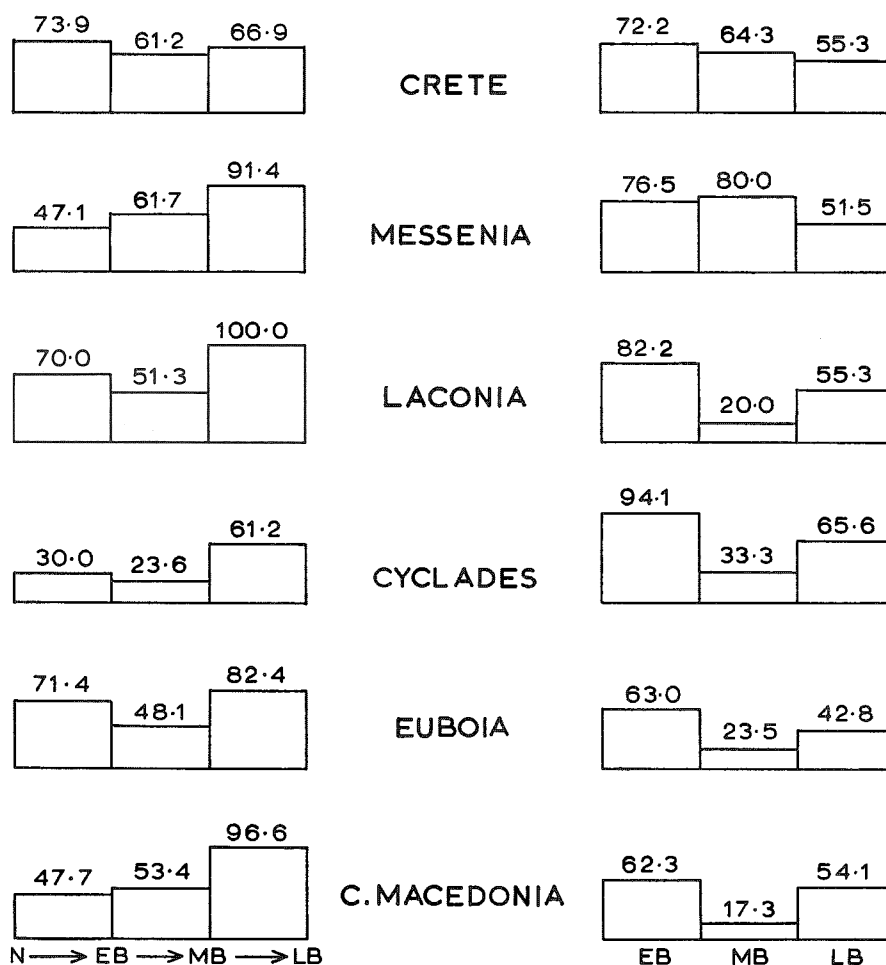


FIG. 14.9 Continuity in the occupation of settlements in the prehistoric Aegean. On the left, the histograms indicate the percentage of sites in each region which continued to be settled in the succeeding period. On the right, the histograms show the percentage of sites in the appropriate period which were newly settled (cf. Table 14.7).

chaeological material demonstrates undoubted continuity, is not strikingly higher than for some other areas, where certain authors have suggested a change of population. We may note too that the high figure of 70 per cent for the neolithic to early bronze age transition in Crete, paralleled in Laconia, does not strongly suggest the advent of a new population.

For the middle bronze age to late bronze age transition, between 61 per cent and 100 per cent of settlements persist into the late bronze age, although we should note that the higher percentage may in part be connected with the shorter length of time involved.

The low figures for the Cyclades are striking, as is the high percentage of settlements that are on new locations at the beginning of the early bronze age period. This might suggest the influx of new people, or a situation of unrest, or alternatively, a considerable population explosion with the consequent foundation of many new settlements. A simple change in settlement pattern could produce the same result.

The histograms indicating the percentage of sites that are new clearly reveal in addition the reason for the decline in settlements recorded in some areas during the middle bronze age, as observed in the last section. This was not due to an increase in the abandonment of sites, for the wastage, as indicated by the histograms just discussed, did not change markedly. The new factor is the decline in the rate of foundation of new settlements. The decline then in the settlement density (if it does represent a true decline, rather than reflecting the shortness of the period) was the product of the natural wastage of sites, at a normal rate, together with the *failure* to set up new ones. It is at this period that the shorter duration of the middle bronze age, less than half that of the early bronze age, is relevant. The percentage of new sites *per century* in the middle bronze age was actually greater in Crete and Messenia than during the early bronze age.

Finally, one more test may be applied. Knowing the number of sites recorded as occupied in a specific period (say the neolithic), and the number of sites recorded as occupied in the next period (say the early bronze age), we may calculate how many of these sites one would *expect* to have been settled at both periods, given a random arrangement. (This implies that all the sites in question had an equal chance of being settled in the first period, and that they all had also an equal chance of being settled in the second.) We may therefore compare the observed figures with those predicted for a random distribution, to see whether there is a notably strong correlation between successive periods.

The observed figures are of course available. The predicted figures are calculated knowing the number of sites occupied in period 'a' (N_a) and the number occupied in period 'b' (N_b). The predicted figure is ² $\frac{N_a \times N_b}{2(N_a + N_b)}$.

2 The formula is obtained as follows: If, when looking for neolithic or early bronze age sites, we score N_a neolithic observations and N_b early bronze age observations respectively the problem is to determine how many sites should have traces of occupation of both periods. (Sites with occupation of neither period are ignored.) The total number of observations made is $N_a + N_b$. If the distribution is random, an observation has the chance $\frac{N_a}{N_a + N_b}$ of scoring for period 'a', and $\frac{N_b}{N_a + N_b}$ of scoring for period 'b'. So the chance of an observation for scoring both is $\frac{N_a \times N_b}{(N_a + N_b)^2}$. And the estimated number

The observed and predicted values for sites continuing in occupation from one period to the next are given in Table 14.8. Such analyses as this have not previously been undertaken, and the interpretation of the figures in Table 14.8 is not easy. Clearly the Cyclades fall below the general level of continuity, but the number of sites there, for the neolithic period at least, is so small as to be of limited significance. What emerges most clearly is the high continuity in most regions, especially from middle bronze age to late bronze age, but this could again relate largely to the short duration of the periods in question.

TABLE 14.8 Comparison between the number of sites occupied in successive periods, and the number predicted by the formula $\frac{N_a \times N_b}{2(N_a + N_b)}$. The ratio is the number of observed sites occupied in both periods, divided by the number of sites predicted. (The maximum possible ratio is 4.0.)

Region	Neo to EBA			EBA to MBA			MBA to LBA		
	obs.	Calc.	Ratio	obs.	Calc.	Ratio	obs.	Calc.	Ratio
Crete	31	15.3	2.04	68	35.2	1.90	127	57.0	2.22
Cyclades	3	4.2	0.72	12	6.7	1.80	11	5.8	1.92
Messenia	8	5.7	1.42	21	12.8	1.64	96	34.4	2.80
Laconia	7	4.0	1.76	20	5.8	3.44	25	8.7	2.84
Euboia	20	9.3	2.16	26	10.4	2.50	28	10.0	2.80
Central Macedonia	17	10.2	1.66	24	8.8	2.74	28	9.8	2.83
Average Ratio			1.62			2.34			2.56

In general the histograms of fig. 14.9 seem to give the clearest indication of the underlying processes at work. In general the deciding factor was not the number of sites which continued to be occupied, a high figure except in the Cyclades. It was, rather, the number of new settlements founded.

Having studied the settlement figures we may now go ahead to use them for the estimation of the prehistoric human population.

of observations scoring both is $\frac{N_a \times N_b}{N_a + N_b}$, so that the predicted number of sites scoring both, with two observations per site, is $\frac{N_a \times N_b}{2(N_a + N_b)}$. In addition we may remark that the number of sites with occupation of only one period is predicted as $N_a + N_b - \frac{N_a \times N_b}{N_a + N_b}$. (The prediction for the total number of different sites is $N_a + N_b - \frac{N_a \times N_b}{2(N_a + N_b)}$.)

Population Density and Population Size

The determination of early population figures is a notoriously difficult task. All the discussion so far, in dealing with settlement pattern, has deliberately been set in relative terms. We do not know the original real settlement density: we can speak with precision of the *observed* density of occupation.

Yet in order to visualise the societies with which we are dealing, their problems of subsistence, and of social organisation, some notion of absolute figures is needed. It can plausibly be argued that the single most significant feature which distinguishes the modern world from the ancient world is the greatly increased density of population. Many of the largest population centres in the ancient world would barely rank as towns today in terms of size.

In the foregoing sections, the observed density of settlement has been calculated, and the approximate size of settlements in each period discussed. These estimates can now be made to form the basis for calculations towards a tentative figure for the prehistoric population in each of the regions in question.

This entails estimates for two factors. The first, and crucial, step is to suggest what proportion of prehistoric settlements originally in existence are represented in the survey data now available.

Although this factor is exceedingly difficult to estimate, one result already obtained may be helpful. We have seen that the number of Cycladic early bronze age sites known, if cemeteries be included, is 127. Yet, if we count only those sites known also from the settlement remains, the number is reduced to 51 (Table 14.3). The latter figure is much more in harmony with the data from other regions, and was utilised in the graph, fig. 14.2. The apparent distortion resulting from the use of the larger figure is seen in fig. 14.10.

The reason for this high, perhaps disproportionately high, figure for the Cycladic early bronze age is easy to pinpoint. It is large because the early Cycladic cemeteries are today very easily discovered, difficult to destroy and rich in saleable finds, which bring them to the attention of archaeologists and others. These finds have excited interest since early in the last century. The graves are generally cist graves, built of large flat slabs of marble and schist. Safely buried underground, these very effectively preserve the contents. It follows, then, that we are more likely today to have a tolerably good knowledge of cemeteries in the Cyclades than of settlements there or in other areas.

The difference between the cemeteries known and the settlements recognised is thus a highly significant one. It seems likely, since every cemetery obviously had an accompanying settlement in prehistoric times, that the figure of 127 is a better estimate for prehistoric settlements in the islands than is 51. This suggests that in the early bronze age Cyclades, it may be necessary to multiply the figure for observed settlements (51) by a factor of 3 to obtain a more reasonable estimate of the original number of settlements. The same may conceivably hold for other regions.

It is proposed therefore that to obtain an approximation for the original total number of settlements in the Aegean early bronze age, the figure for the observed settlements be multiplied by a factor of 3. Since late bronze age pottery is very characteristic, especially in southern Greece, and of course near the surface on deeply stratified sites, a factor of

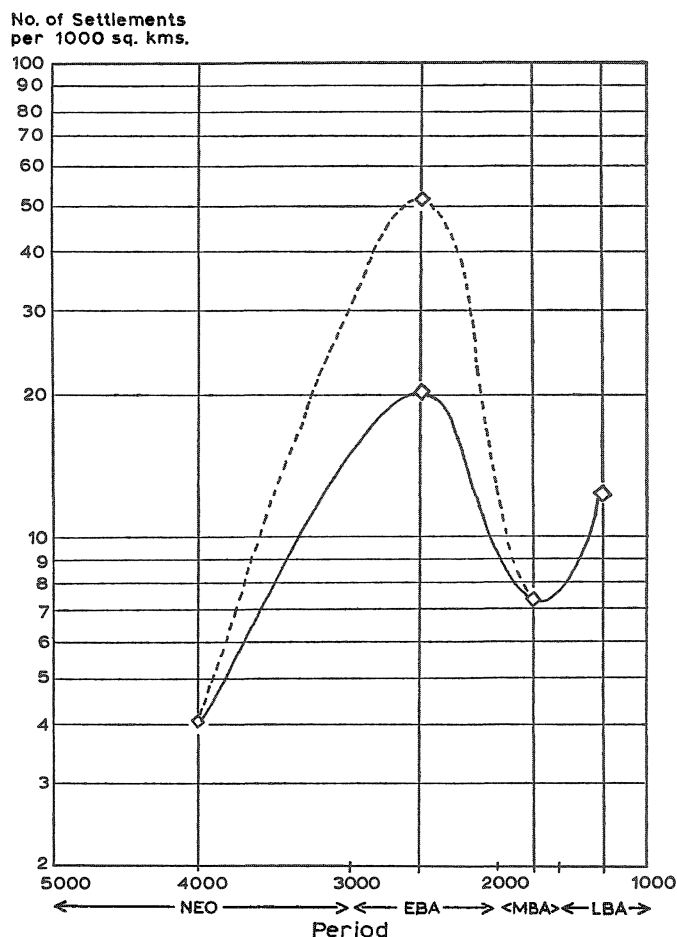


FIG. 14.10 Growth in settlement numbers in the Cyclades. The continuous line refers only to sites where actual settlement remains have been found, the broken line includes also those locations known solely from cemetery finds.

only 2 is proposed for the late bronze age, and a factor of 2.5 for the middle bronze age. For the neolithic period, where sites are not always easy to recognise, a factor of 4 is suggested.

The second problem facing us is the average population per settlement. Here the estimates of settlement size are useful. The figures of 5,000 sq m, 10,000 sq m, and 20,000 sq m for the neolithic, early bronze age and late bronze age periods of the Aegean were

obtained above (fig. 14.7). A figure of 15,000 sq m may be taken for middle bronze age settlements.

In converting these areas to population figures we may refer to Frankfort's estimate for Mesopotamian urban sites, where he suggested a population density of 400 persons per hectare (1950, 103). Even in late bronze age times in the Aegean, the population was probably not so closely packed together as in a Sumerian town. So 300 persons per hectare will be taken here for the early bronze age, middle bronze age and late bronze age periods, when Aegean settlements were of urban or proto-urban nature. For the neolithic period, when houses were sometimes more widely spaced, a figure of 200 persons per hectare is suggested.

This gives an estimated population for an average settlement in the neolithic period of 100 persons, for the early bronze age period of 300 persons, for the middle bronze age of 450 persons and for the late bronze age of 600 persons. Conceivably the areas of settlement utilised reflect in each case the upper limits of settlement size for the period in question rather than an average. If this be so, the average population per settlement in each period may have been less than the estimate reached here. The estimated figures for total population in each region may thus err on the side of generosity.

Finally it is necessary to guess how many of the settlements observed in each period were actually occupied at the same time. For the neolithic, early bronze age and late bronze age periods, each 500 years or more in duration, a figure of $\frac{3}{4}$ is suggested. For the middle bronze age, which was rather shorter, the assumption is made that the settlements observed were simultaneously occupied.

These figures now enable a calculation of the population for each area. For example, survey of Crete has yielded 284 late bronze age sites. The factor of 2 suggested implies that the original total of late Minoan sites was 568. A factor of $\frac{3}{4}$ indicates that 426 late bronze age sites may have been occupied at once. An average of 600 persons per settlement, as suggested, yields a total population in late bronze age Crete of 260,000 persons. The same procedure for other regions leads to the population estimates given in Table 14.9.

TABLE 14.9 Estimated approximate population figures for various regions of prehistoric Greece. (The figure in brackets for neolithic Euboia includes sites known only from finds of obsidian.)

<i>Region</i>	<i>Neo</i>	<i>EBA</i>	<i>MBA</i>	<i>LBA</i>
Crete	12,600	75,000	214,000	256,000
Cyclades	3,000	34,400	20,300	28,800
Messenia	5,100	23,000	118,000	178,000
Laconia	3,000	26,300	28,000	50,000
Euboia	4,800 (8,400)	36,500	38,200	44,100
Central Macedonia	10,800	31,700	32,600	55,000

These figures are plotted, again on a logarithmic scale, on fig. 14.11.

The distinction between the growth pattern A and B discussed above is a very clear one still. But it is now only in the Cyclades that a positive decline in population is seen during the middle bronze age. In other regions of pattern B the population is effectively stationary at this time, but it does not decline.

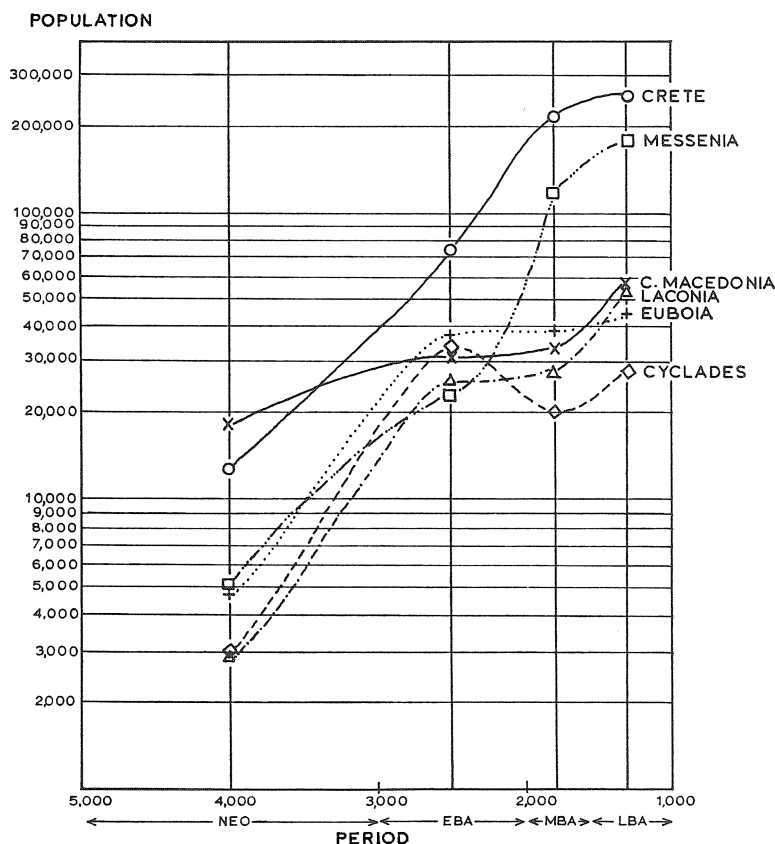


FIG. 14.11 Estimated growth of population in the prehistoric Aegean (cf. Table 14.9).

Table 14.10 uses the same data to calculate the estimated population per square kilometre at each period.

These figures are plotted on a logarithmic scale on fig. 14.12. We see that the estimated population density in neolithic times lay between 0.8 and 1.6 persons per square kilometre for the different regions. From then on the regions of southern and northern Greece diverge markedly, since the population density in central Macedonia rises only very slowly.

In southern Greece the early bronze age population density lies between 7.5 and 14. This is a striking increase, by a factor of 10, over the neolithic density. In the middle

bronze age the figure lies between 8 and 42: it is the regions of growth pattern A which are now setting the pace. And in the late bronze age the variation is between 11 and 63. The regions of pattern B have increased little, if at all, over the early bronze age figure, those of pattern A by a factor of 3 and 8 respectively.

These figures form the fundamental background to the development of Aegean civilisation. They compare surprisingly well with more recent population figures for the different regions (Renfrew 1971).

TABLE 14.10 Estimated approximate population densities for various regions of prehistoric Greece, expressed in number of persons per square kilometre. (The figure in brackets for neolithic Euboea includes sites known only from finds of obsidian.)

<i>Region</i>	<i>Neo</i>	<i>EBA</i>	<i>MBA</i>	<i>LBA</i>
Crete	1.53	9.18	26.10	31.30
Cyclades	1.20	13.80	8.10	11.60
Messenia	1.77	8.04	41.20	63.30
Laconia	0.84	7.50	8.00	14.30
Euboea	1.35 (2.34)	10.30	10.70	12.40
Central Macedonia	0.84	2.50	2.60	4.30

There are few estimates for the population of regions in classical Greece with which these figures may be compared. Beloch (1880) calculated for Euboea that, since there were 3,000 hoplites at the battle of Nemea in 394 BC, there might have been 12,000 citizens, and hence 36,000 free people. He estimated the total population of Euboea at that time as 70,000 persons. This compares reasonably with the suggested figure here for late bronze age Euboea of around 45,000 persons.

Turning now to the Cyclades, assuming a late bronze age population of 30,000, we might expect Tenos (which in 1961 numbered 12,000 out of a total for the Cyclades, of 140,000, i.e. 9 per cent) to have had a population of 2,700 in the late bronze age. On the basis of Roman tax returns Beloch calculated a free population of 2,220 persons (740 citizens): the total population, including slaves, would have been greater.

Unfortunately the classical population figures are at least as doubtful as the prehistoric ones, and cannot give any firm corroboration.

The settlement densities (Table 14.10) can also be used for purposes of comparison. Hole and Flannery (1967, 202) have made estimates of the developing prehistoric population of south-west Iran. They suggest a density of 2.3 persons per sq km in the early dry farming stage, rising to 6 per sq km in the fourth millennium period of village specialisation. In the Diyala region of Mesopotamia, the density may have increased by Early Dynastic times to 68 persons per square kilometre of irrigated land (Adams 1965, 24), equivalent to around 54 persons per square kilometre of total land. These are in fact

the population figures for that region today. It is not surprising that the prehistoric settlement densities in the Aegean should in general have been less than those for irrigated lands in the Near East. Messenia and Crete apparently did reach comparable densities, through the practice of Mediterranean polyculture under palace direction, as succeeding chapters will show. There is no contradiction here, however, since Messenia today actually has a population density (88 persons per sq km) considerably greater than that for the irrigated lands of the Diyala region.

In conclusion, Godart's (1968, 63) minimum estimate of 4,264 dependents at the Late Minoan palace at Knossos is relevant. It is reached on the basis of ration records of grain. A further approach from the tablets is to use estimates for the stock controlled by the palaces of Knossos and Pylos. These, as discussed in Chapter 15, are of the order of 80,000. In Crete in 1961 there was a human population of 525,000, and 870,000

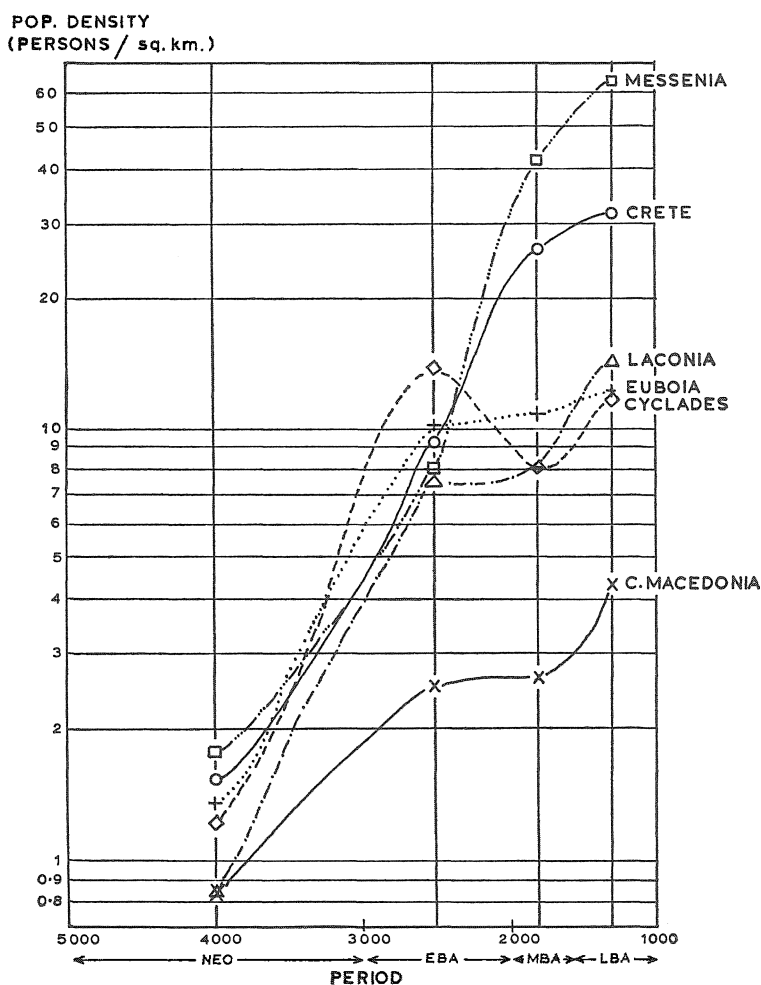


FIG. 14.12 Estimated population densities in the prehistoric Aegean.

stock (including 507,000 sheep). An order-of-magnitude estimate for the population within the lands controlled by Knossos (as defined by the sheep tablets and using the modern ratio of sheep to people) would be around 50,000. This is one fifth of the total population estimate reached for late bronze age Crete. The conclusion that the palace at Knossos controlled economically about one fifth of the populated lands of Crete seems a plausible one. It seems reasonable too that a total population of 50,000 in the territory controlled from Knossos should have supported around 4,000–5,000 persons in the palace itself.

Settlement Location and Hierarchy

In the Aegean early bronze age, as we have seen, fortified proto-urban settlements made their appearance, and were followed in southern Greece by the palace centres of the Minoan-Mycenaean civilisations. In size these proto-urban and palace settlements were not often vastly bigger than neolithic villages, and certainly smaller than the contemporary Near Eastern towns and cities. In many areas the majority of neolithic sites continued in occupation into the early bronze age, and nearly everywhere the middle and late bronze age settlements built upon the pattern established in the early bronze age.

While in Crete and Messenia, on the one hand, growth was as rapid in the middle bronze age as in the early bronze age, so that there are more middle bronze age than early bronze age sites recorded, for the other regions considered (Laconia, Euboia and the Cyclades, as well as Macedonia), actually fewer middle bronze age than early bronze age settlements are known. And while, admittedly, the middle bronze age was shorter, so that one might argue that there is an overall increase in the number of settlements recorded *per century*, the difference in the two patterns of growth is striking. It will be convenient now to look in more detail at two regions representative of these different growth patterns: Messenia and the Cyclades.

PATTERN A: MESSEنيا AND CRETE

Messenia and Crete both saw a rapid and uninterrupted increase in population during the bronze age, resulting in a density of population more than twenty times that in the neolithic period. The growth of settlement in Messenia for the neolithic through the successive phases of the bronze age is seen in fig. 14.13. It gives a vivid picture of sustained growth.

The development of prehistoric settlement in Messenia has been admirably outlined by McDonald and Hope Simpson in their survey (1969, 172). They point out that almost half the early bronze age sites were situated on the coast, while the remainder are along river valleys, principally the Alpheios and the Pamisos.

During the middle bronze age there is a marked increase in population, and the areas with notable concentrations of Early Helladic population continue to be settled. We have seen above that 62 per cent of early bronze age sites in Messenia continued in occupation to the middle bronze age, a figure rivalled only by Crete (61 per cent) and contrasting with 25 per cent and 48 per cent for the Cyclades and Euboea. Many new villages were founded—it is only in Crete and Messenia that the number of new villages founded in the middle bronze age exceeds the number surviving from the early bronze

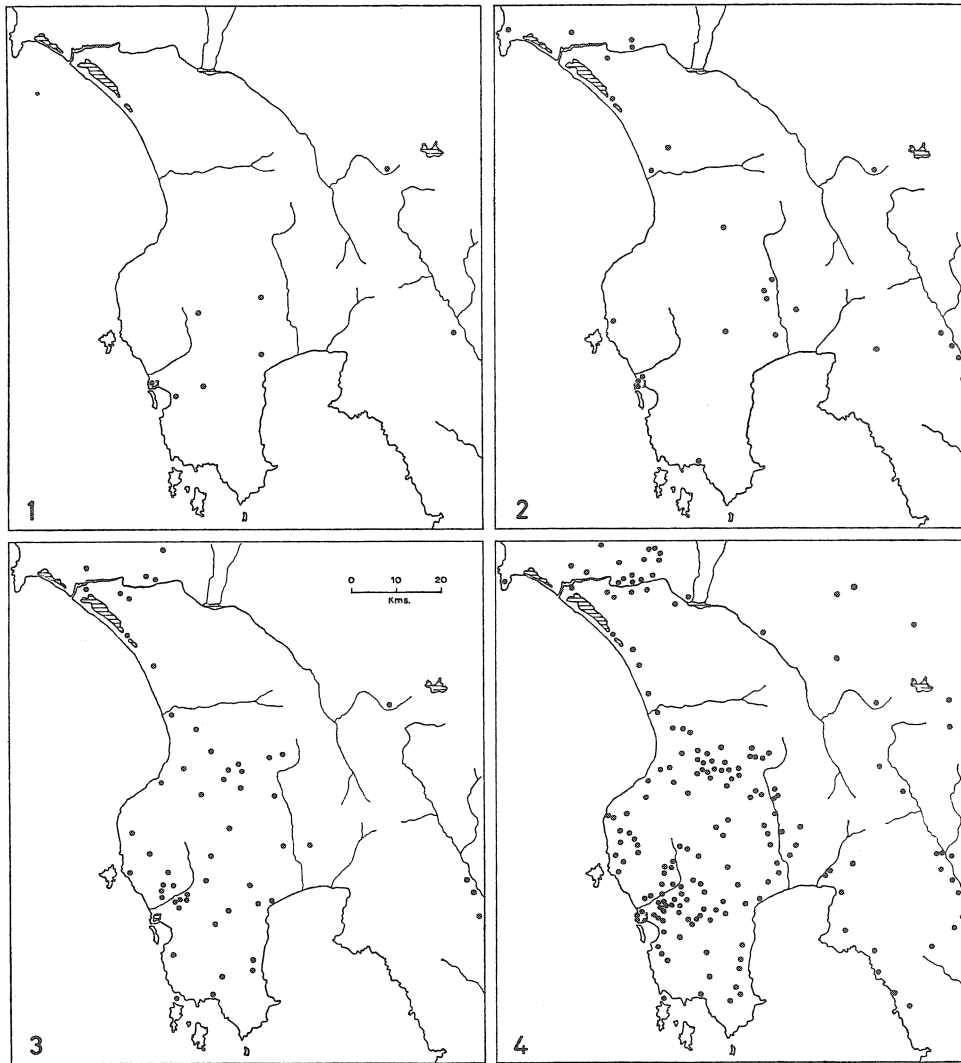


FIG. 14.13 Settlement growth in prehistoric Messenia.
1, neolithic period; 2, early bronze age; 3, middle bronze age; 4, late bronze age.
(based on data by McDonald and Hope Simpson).

age and only in these regions therefore that the total number of settlements actually increases. At this time there is the penetration of what has been termed 'marginal or isolated territory', for reasons which are discussed in the next chapter.

A significant change is that only 15 per cent of the Middle Helladic sites were coastal, a reduction by a factor of three on the Early Helladic proportion. As McDonald and Hope Simpson (*ibid.*, 174) remark: 'It looks as if these people, like their successors, in certain phases of the medieval period, preferred security to accessibility.... Time after time we found that we must "raise our eyes unto the hills", that virtually no strategically located isolated height near good water and reasonably fertile land can be overlooked.... Indeed the "hill fortress" becomes a kind of canon.'

The fortified site of Malthi in terms of the settlement type of the period, may be taken as 'the model—a small town on a high rough hill, first occupied in a major sense in Middle Helladic times, and apparently fortified in that period' (Valmin 1938). It had an area of about 1 hectare (10,000 sq m) and a population therefore of up to about 300 persons. It was entirely enclosed by a fortification wall.

During the late bronze age population continued to increase (until the end of the Late Helladic IIIB period). In Messenia as in Crete there are again more new sites at this time than sites continuing from the previous period. But equally the majority of middle bronze age sites continued in occupation—in Messenia more than 90 per cent of them.

At this time palace centres, such as Pylos, were emerging. The description by McDonald and Hope Simpson (1969, 175) is again relevant: 'The Early Mycenaean period certainly witnessed dramatic social, political and economic changes, even if (in Messenia at least) there was no rapid increase in local population, and no large-scale immigration from outside. The developments most obvious to us now are vastly improved means of producing or acquiring moveable wealth (royal mainly?), and the appearance of specialised occupations and skills, evidenced by such phenomena as wide foreign trade and *tholos* tombs. In addition there is a distinct possibility that literacy had begun to establish itself at local capitals. Traits of the sort described above are usually linked with what the culture historians call "incipient urbanisation". But if urbanisation requires (among other features) a really sizeable concentration of population at administrative centres, it is questionable whether the term can properly be applied to Mycenaean civilisation at any stage.'

A fairly clear picture emerges from the survey of the steady development of settlement and population. It is significant that middle bronze age sites show, by their location, that problems of security were now important. But evidently these problems were solved, for the population continued to increase and prosper. Sections 2, 3 and 4 of fig. 14.13 illustrate that whatever the defensive problems in the middle bronze age the population density increased.

The development of settlement in Crete is not identical to that of Messenia, although their growth patterns are remarkably similar. Both differ from the areas of pattern B in the continuing expansion in the middle bronze age. Crete, however, shows no sign dur-

ing the middle bronze age of the security problems which evidently troubled Messenia in common with other regions. There is no emerging preference for acropolis sites in Crete at this time, nor are the settlements fortified.

At the end of the Late Minoan Ib period in Crete a number of major sites were abandoned, but in fact Pendlebury lists more sites for Late Minoan III Crete than for Late Minoan I. It is not until the end of the Late Minoan period that a 'flight to the hills' is seen, with a sharp reduction in the number of settlements.

The evident peace and security of Crete in the middle and late bronze age may be associated with the emergence of palatial centres, and indeed of a settlement hierarchy. Such a hierarchy can be discerned also in Messenia, and indeed in Euboia during the Late Helladic IIIA and IIIB periods. As Hood, Warren and Cadogan (1965, 52) have written: 'The general character of settlement in bronze age Crete is beginning to emerge with greater clarity.... Besides the great cities of Knossos, Phaistos and Mallia there were many lesser towns, some of which at any rate may have had small "palaces". Outside the towns, the countryside was dotted with farms and villas, isolated or in small groups or hamlets of two or three houses.' (The terms 'city' and 'town' should however be read in the light of the remarks above on settlement size.)

Fig. 14.14 shows the major palace centres of Crete, and the villas, as documented by Graham (1962, pl. 1). They are plotted with the modern population centres and transport axes of Crete, on the background of the major cultivated areas. A modern classification of the major sub-regions of Crete is also shown (Allbaugh 1953 [map at rear], for cultivated area; Smith 1966, fig. 1 for sub-regions). Modern villages and the minor late bronze age settlements, which are very numerous, are not shown. The picture which emerges is that in late bronze age times a hierarchy of palaces, villas and smaller settlements was already established which foreshadows strikingly the settlement hierarchy seen in modern Crete.

The systematic hierarchical organisation documented in the records, and illustrated on the map, demanded and brought a measure of peace and internal security. Clearly one of the secrets of Crete's stable settlement growth was an absence of defensive problems, facilitated by the existence of ample non-coastal arable lands and probably by an adequate control of the sea.

Messenia shared the advantages of ample and rich lands lying some distance from the sea, and out of the way of pirates, so that despite difficulties reflected in the defensive situation of middle bronze age settlements there a continuous growth was achieved.

These two areas, whose development conforms to growth pattern A, were precisely those which in the late bronze age reached the full development of Minoan-Mycenaean civilisation as reflected in the palaces of Pylos and Crete. The deduction from this line of reasoning would be that the Argolid, with its palaces at Mycenae and Tiryns, should also conform in its growth to pattern A rather than to pattern B. Future site survey in this area will set the hypothesis to the test.

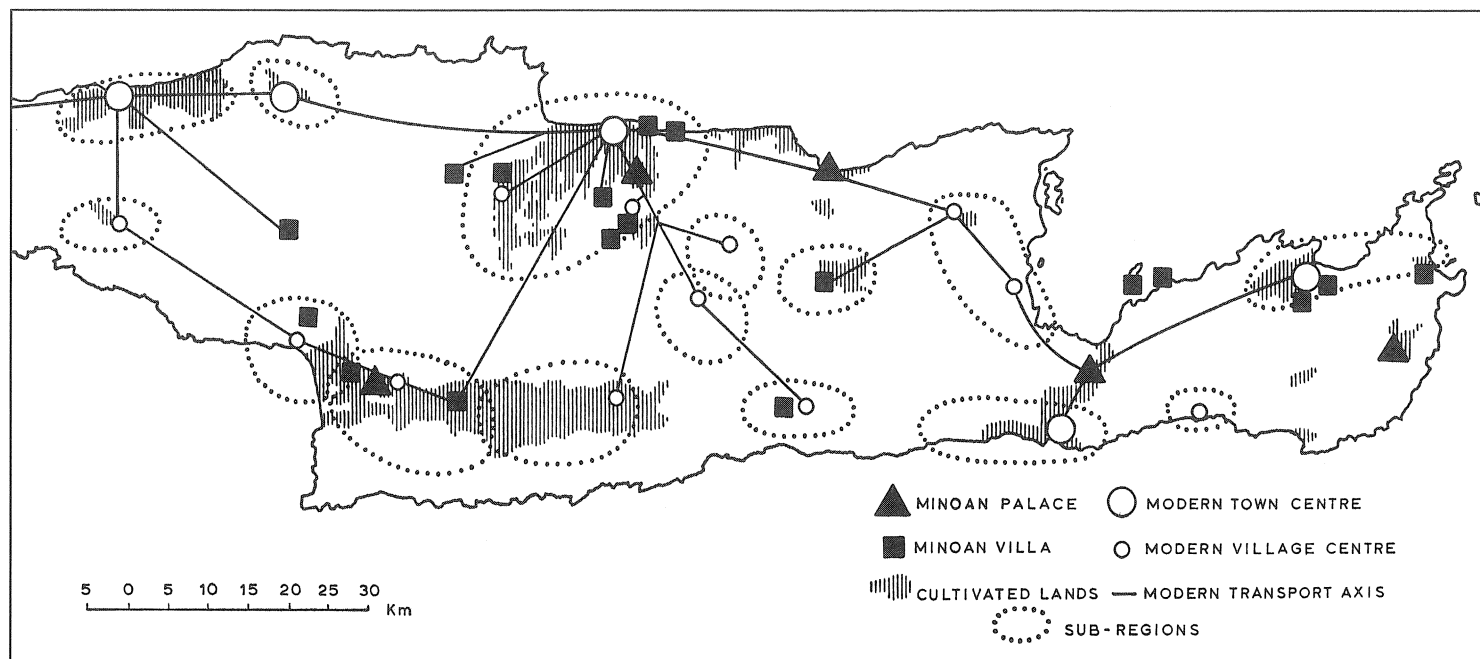


FIG. 14.14 Settlement hierarchy in prehistoric and modern Crete. The Late Minoan distribution of palaces and villas compares strikingly with that of modern towns and village centres. (The numerous smaller prehistoric sites, and modern small villages are omitted.) Both relate logically to sub-regions and to cultivable land (see notes to the figures).

PATTERN B: THE CYCLADES, LACONIA AND EUBOIA

The regions whose development conforms to growth pattern B did not have the same extensive areas of inland plains as do Messenia and Crete. In Euboea, and the Cyclades in particular, it is difficult ever to be more than a few kilometres from the sea.

Naturally the early bronze age settlements made full use of the sea; the majority at this time were on low promontories, often with a sheltered beach on each side. Good examples of this type of site are seen at Pyrgos in Paros and Aghia Irini in Kea (pl. 14, 2) and at Manika in Euboea (fig. 14.15). Often, as at Pyrgos and Manika, the cemetery lay a little further inland, or sometimes on the steeper slopes of the promontory.

Already at this time some of these sites were fortified—Manika, for instance, and Askitario. Troy and Lerna, although not actually on promontories, lie close to the sea, offering similar advantages: they too were fortified (figs. 18.11 and 18.13). In Euboea, significantly, ‘nearly all of the coastal neolithic sites were reoccupied in the Early Helladic period, while the majority of inland sites were never revived’ (Sackett et al. 1967, 86). There is a preference for coastal settlements in Laconia also (Waterhouse and Hope Simpson 1961, 168).

Just a few settlements, however, were of acropolis or *kastro* type, set safely on a high hill, often some way from the sea. The Kastri at Chalandriani in Syros may be used to illustrate this type of acropolis settlement (pl. 14, 1; fig. 14.15) which becomes increasingly popular in the middle bronze age. It does, in fact, lie close to the sea, but the advantages of convenience offered by a promontory location have been sacrificed to those of security ensured by the hilltop situation.

In the middle and late bronze age the number of known settlements decreases markedly. Sites in the Cyclades are now clearly chosen at least as much for their defensibility as for their access to the sea. Rizokastelia in Naxos, for example, is a remote acropolis site of this kind, and Paroikia in Paros is set on top of the sea-cliff. Coastal sites like Aghia Irini and Phylakopi are now defended by massive stone-built walls of a much more substantial character than those of the preceding period (pl. 21.3). Together with the walls of Aegina and Argos they are the true precursors of the Cyclopean walls of the Mycenaean late bronze age.

Some of these settlements are now considerably larger—Phylakopi and Paroikia are examples—and the transition from early bronze age to middle and late bronze age is accompanied by a general increase in size as well as this change in the type of site preferred.

In Euboea the number of settlements is reduced in the middle bronze age, and 15 out of 23 settlements are of the acropolis type. In Laconia too, hill sites were preferred, some of them perhaps fortified, while a number of the smaller Early Helladic settlements were abandoned. In Crete and Messenia, as we have seen, some villages develop into proto-urban and palace centres, and a straightforward hierarchical pattern develops. In the Cyclades, however, the population seems to withdraw, rather, to stronghold centres. These were much larger than the early bronze age villages, and many of the latter were

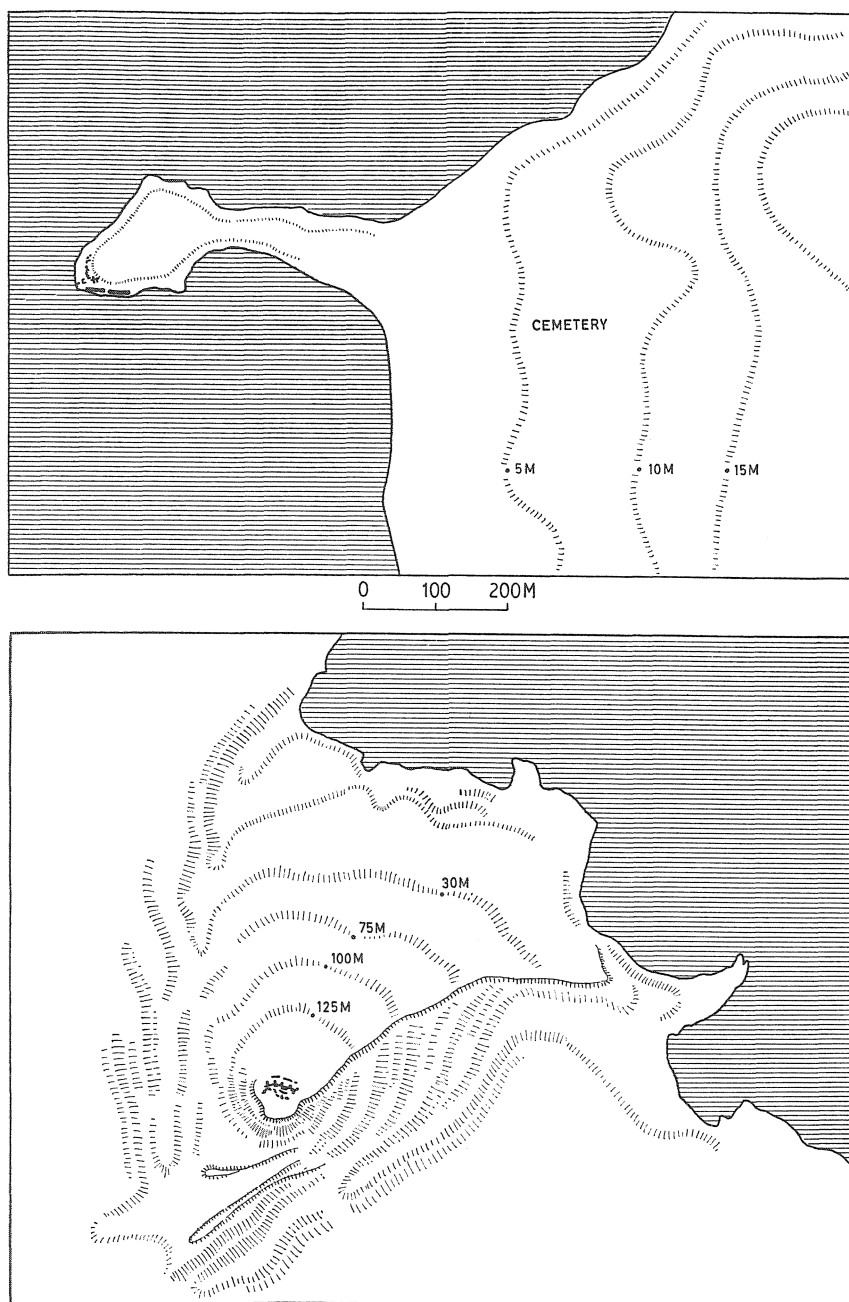


FIG. 14.15 Two types of settlement in the third millennium Aegean. (*Above*) the promontory settlement (Manika in Euboia); (*below*) the hilltop settlement (Kastri near Chalandriani in Syros). Note the fortifications at each.

abandoned. Indeed an altogether different settlement pattern develops: each island in general has only one major population centre, sometimes with just a few minor ones as well. At the end of the early bronze age, Syros already had the Kastri of Chalandriani, Melos the key township of Phylakopi, and Paros the single settlement of Paroikia. The same general pattern is seen in late bronze age Euboia where it is suggested that 'there was one main and presumably dominating town to each area' (Sackett et al. 1967, 99).

What we see happening is something rather different to the development of the prosperous palaces like Pylos or Phaistos. We see anticipated, in a sense, the island city states of classical Greece, where normally each island had a single city centre—just as late bronze age Tenos had Akroterion Gurion, or Paros had Paroikia. Because of their rocky terrain, some islands harboured more than one city state in classical times—Amorgos had three. And it is in these islands, such as Amorgos, that more than one fortified centre may have existed in the late bronze age. Clearly the nature and location of these sites was governed by the need for security.

PIRACY AND SECURITY IN THE PREHISTORIC AEGEAN

The chief factor producing these changes in settlement distribution and settlement type may well have been piracy. The words of Thucydides (I, vii–viii, Loeb edition) are highly relevant here, and particularly interesting as possibly the first discussion anywhere of a settlement pattern. He was writing in Classical times, when coastal sites were again favoured, and the 'older cities' to which he refers were of the middle and late bronze age:

'However cities which were founded in more recent times when navigation had at length become safer, and were consequently beginning to have surplus resources, were built right on the sea.... But the older cities, both on the islands and on the mainland, were built more at a distance from the sea on account of the piracy that long prevailed—for the pirates were wont to plunder not only one another but also any others who dwelt on the coast but were not seafaring folk—and even to the present day they lie inland.'

'Still more addicted to piracy were the islanders.... But when the navy of Minos had been established, navigation between various peoples became safer—for the evildoers of the islands were expelled by him and he proceeded to colonise most of them—and the dwellers of the sea-coast now began to acquire property more than before, and to become more settled in their homes, and some seeing that they were growing richer than before began also to put walls round their cities ... the weaker cities were willing to submit to dependence on the stronger and the more powerful men with their enlarged resources were able to make the lesser cities their subjects. And later on ... they made the expedition against Troy.'

This passage, I believe, contains the key to the understanding not only of the various settlement types, but of the different growth patterns of the time. The nature of the

middle bronze age and late bronze age strongholds is explained. The vulnerability of coastal lands and the relative prosperity of inland regions is indicated. The acuity of the problem in the islands is underlined. The advantages of a centralised hierarchical power structure, as in the Minoan civilisation, are brought out. And the development of regional territorial states in Greek times is explained.

It is piracy, a special form of hostility, rather than warring between towns or cities, which can best explain the differences in the prehistoric Aegean growth patterns. The evidence of the fortifications indicates that this had already become a problem in the early bronze age, following the great expansion of settlement and population at that time. The choice of defensible locations for middle bronze age settlements, especially in the islands, followed. The evidence from the Middle Ages, when an analogous situation held in the Aegean, makes this very clear:

'Piracy has in all ages been the curse of the Aegean, and at this time the corsairs of every nation infested that beautiful sea. Skopelos and Keos, the volcanic bay on Santorin, and the fine harbour of Ios were favourite lairs of the pirates; they infested the terrible Doro channel between Andros and Euboia, and robbed one of the island barons in the havens of Melos ... the exploits of these men and the terrible devastation which they wrought on the small and more defenceless islands may easily be imagined.' (Miller 1908, 580)

During the Middle Ages, piracy was practised not only upon passing merchant vessels, but upon any island settlements inadequately defended, nor was it merely the occupation of ruffians of no account, but of lords and barons. Applying this picture to the later bronze age, we may imagine raiding pirates from one island setting out in their long ships to plunder another. Hasluck (1910–11) has documented the terrible mediaeval depopulation when slave raiders and pirates brought about the complete abandonment of several islands. And Miller (1908, 590 and 598), giving further details:

'We are told at this time that the serfs had fled from Anaphe, Amorgos and Stampalia to Crete because they did not think it worthwhile to sow in order that Turks and Catalans might reap.... At both Naxos and Siphnos there was such a lack of men that many women were unable to find husbands ... at Seriphos, so rich forty years earlier, nothing but calamity: the people passed their lives like brutes and were in constant fear, day and night, lest they should fall into the hands of the Infidels. Syra, destined in modern times to be the most flourishing of all the islands, was then comparatively of no account: the islanders fed on carobs and goats' flesh and led a life of continual anxiety.... The people of Paros were in the same plight, the principal town of Paroika had few citizens while pirates frequented the big bay at Naoussa. Antiparos and Sikinos were abandoned to eagles and wild asses, and most of the other islets were deserted.'

The numerous graphic accounts of the tribulations of the Archipelago in the Middle Ages are of value in reflecting the difficulties of life among these small islands when

there is no controlling authority, when ships and weapons are available, and plunder is easy. The comparison is made very plausible by the mediaeval settlement pattern, where generally the villages (often just one per island) were set on a defensible hill a safe distance from the sea. The *plaka* of Melos, the *kastro* of Siphnos and Kea, and the village of Seriphos are very good examples of villages of this type, the exact counterparts of middle bronze age fortified settlements like Aghios Andreas on Siphnos or Vryokastro on Tenos.

These mediaeval villages were defended by the ingenious expedient of building a continuous perimeter of houses whose thick outside walls were windowless, the continuous outer wall so formed being interrupted by a single gate. This arrangement is still seen at the *kastra* of Siphnos, Antiparos and Kea. Miller (*ibid.*, 599) describes such a stronghold in fifteenth-century Ios: 'To this castle the peasants used to climb up every evening from their plots of land in the rich plain below, nor did they dare to open their gates in the morning and sally forth till the old women whom they sent out before dawn reported that the coast was clear and no pirate craft was seen careening in the fine harbour.'

The middle and late bronze age settlement pattern is closely similar to that of the Middle Ages. And there is ample evidence to document the frequency of piracy in ancient times (Ziebarth 1929). Pompey the Great made his name by clearing the Aegean Sea of pirates in 67 BC. And Thucydides himself recalls its prevalence in the days before the sea power of Minos.

This allows us to explain the virtual disappearance of the small village in the Cyclades and other areas of pattern B and its replacement by the small fortified township. In Crete and Messenia, however, although piracy may have been a problem, the development of the village palace hierarchy was not severely impaired.

Above all, the decline in population in the Cyclades in the middle bronze age becomes altogether intelligible. The prosperity of the early bronze age and the improvement in ship building made piracy both profitable and easy. The result was a partial depopulation, not as serious as that in the sixteenth century AD, but of a similar nature.

The emergence of wealth in the early bronze age, and the accompanying production of daggers and other weapons, are discussed in later chapters. It seems that this increase in wealth and the development in armaments brought with them social problems, which in some regions of Greece were not adequately overcome. Only in favoured regions, where the terrain encouraged the development of more centralised organisation, was the population growth safe. In these regions came the first emergence of Minoan-Mycenaean civilisation.

Chapter 15

Natural Environment

and the Subsistence Subsystem

Man is brought into most active and intense interaction with his natural environment through the food quest. Other aspects of his existence, such as the provision of warmth and shelter, or of inorganic raw materials, also bring him into contact with other aspects of the natural environment, but often these are more readily controlled. Normally they do not involve that dynamic interrelation with the ecological environment, that very active participation with the ecosystem, which hunting, food gathering and food production, each in their different ways, imply.

In seeking to comprehend the transition from palaeolithic hunting society to late bronze age civilisation, our attention first focuses upon the various occupations and activities which make up the subsistence subsystem of a society. For Near Eastern and other civilisations, sometimes designated 'irrigation civilisations', it has been claimed that improved food production (resulting from the introduction of irrigation) was primarily responsible both for population increase, and for elaborated social organisation arising from the production of a 'surplus'. The suggestion then is that civilisation in those lands is the 'result' of improved food production through irrigation. Nothing of the sort is claimed here for the Aegean. None the less it will be seen that one subsistence development, the introduction of 'Mediterranean polyculture', based on the olive and vine, as well as the ubiquitous cereal products, was fundamental to the development of Aegean civilisation. I wish to suggest that the significant effects of this change can be seen already in the early bronze age, at just that time when metallurgy is growing in importance. There is a casual link here which has not been adequately investigated. The development of the subsistence subsystem, it will be argued, is one of the fundamental changes in the overall culture system which permitted the emergence of civilisation.

In the sections which follow the natural environment, and the changes in it, will be reviewed. Then the various phases of cultural development will be considered as follows:

1. The exploitation of the environment in the palaeolithic (phase I of the developmental sequence outlined in chapter 4);

2. The coming of farming (phase II);
3. The diversification in the farming pattern (phase III);
4. The development of Mediterranean polyculture (phase IV);
5. Subsistence in the palace economy (phases V and VI).

Finally the relationship between population and the subsistence system is briefly considered: the effect on diet, and hence on potential population density, of the cultivation of tree crops was an important one. The fundamental nature of the subsistence changes in the bronze age, first seen in the early bronze age, is underlined.

Conditions in the Palaeolithic: The Environmental Background

The best available description of Greek lands was given by Phillipson (1959 and earlier works) and a concise description is clearly set out in the Naval Intelligence Division Geographical Handbook ('Greece' 1944). The importance for the history of the Aegean of the basic geographical determinants was underlined by Ellen Semple (1932), a pioneer in historical geography, and later by Myres (1953), himself a pioneer in geographical history. Indeed the perennial and basic conditions of Greek civilisation—the sea and the olive—have long been recognised with others scarcely less important—the vine, marble, etc. And already in the first millennium BC the history of Athens, with the ever-present anxieties over grain supplies and wood for ship-building, suggests potential deficiencies, which were to hamper the growth of Greece at the time of the Industrial Revolution of northern Europe.

Geologically Greece consists of three major regions ('Greece' 1944, I, fig. 2). In Thessaly and Macedonia are rocks of early origin, much metamorphosed. The fracturing and subsidence of Tertiary times produced the Aegean Sea: the Aegean Islands are thus the fragmentary remains, above water, of an old land surface.

In southern and western Greece are rocks of more recent date, of sedimentary origin, but compressed, folded and metamorphosed in Tertiary times, to produce the limestones, marbles and schists so characteristic of the Greek landscape. Subsequent erosion and faulting have resulted in the modern Greek scene—while volcanic activity, notably among the Aegean islands, has produced recent igneous deposits, for example, in Methana, Melos, Antiparos, Santorin and Nisyros.

The soils of Greece (*ibid.*, fig. 7) to some extent follow this geological picture. In southern and western Greece there are large areas of limestone rock soils, and in the higher lands of *terra rossa*, the weathering product of limestone. There are in the south few large areas of alluvial soil, although small yet important deposits are found in Messenia, the plain of Argos, the Mesara plain of Crete, in western Euboea and in Boeotia. All of these areas were rich in prehistoric times.

In north and north-eastern Greece, on the other hand, there are much larger plains in Thessaly, in west Macedonia, in the valley of the Strymon, in the plain of Drama

and along the Thracian coast. These were the chief areas of prehistoric settlement in northern Greece.

The climate of Greece is typically Mediterranean: warm, wet winters and hot dry summers, with frequent clear skies and strong winds. The modifying effect of altitude in the mountains and of proximity in the north to the European land mass make possible the division of Greece into three broad climatic regions (*ibid.*, fig. 62). In the south and west there is a true Mediterranean climate: the mean temperature in winter in this region rarely falls below 8 or 9° C. There is variation in rainfall in this area, however: in the west the annual precipitation is about 800–1,200 mm, while in central Greece and the eastern Peloponnese it is below 400 and 800 mm respectively. In the Cyclades the rainfall is below 400 mm.

The coastal and interior plains of Thessaly, Macedonia and Thrace have a modified Mediterranean climate with very hot, sometimes suffocatingly hot summers and rigorous winters. Often there is frost or snow. Frequent summer storms produce a secondary rainfall maximum in June or July. Finally there is the Mountain climate of the highlands of the Pindos and Peloponnese. Temperatures are lower, and precipitation higher, exceeding 1,200 mm in the Pindos mountains.

The original vegetation of Greece was probably very different from that of today, even in regions where there is no cultivation. Deforestation, the result of forest clearance or the commercial exploitation of wood, has been followed by overgrazing in many areas (Mitchell 1957, 82). Turrill (1929, 350) divides the vegetation of Greece into three or four main types, which correlate broadly with the climatic zones (fig. 4.2). True Mediterranean vegetation covers the area of true Mediterranean climate, together with the central and southern islands of the eastern Aegean, such as Lemnos, Chios and Samos, and also with the highlands of the Peloponnese. He distinguished a southern area of true Mediterranean vegetation, and a distinct region of the north-west coast.

The area of modified Mediterranean vegetation corresponds to that of modified Mediterranean climate. In the mountain climate zone of the Pindos is a forest zone of central European type.

In the Mediterranean domain the forest zonation is as seen in fig. 15.1. In the words of the Naval Handbook ('Greece' 1944, I, 110): 'While it is true that the greater part of Greece would under natural conditions be covered with more or less continuous woody communities of forest and tall brushwood, and before the advent of man probably was so covered, open communities dominated by low scrubby and herbaceous plants now occupy much of the area not under cultivation.'

For an insight into the natural environment before the time of the first farmers we must turn to pollen analysis and to archaeological finds. These also give information on the important question of climatic change during the past 10,000 years.

Evidence of post-Pleistocene climate change is at present exceedingly limited, although Dr Judith Turner and her collaborators are working on deposits from central and northern Greece, Van Zeist and Dimbleby have been active in west Macedonia (Rodden 1962, 274) and Wright in the Peloponnese. Dutch work in the plain of Drama

indicates dense forest cover, chiefly oak and elm, in the period shortly after 6000 BC (van der Hammen, Wijmstra and van der Molen 1965, 38). Bottema (1967, 26) working in north-western Greece indicates a forest cover of deciduous oaks in the earlier part of the Postglacial period after 8000 BC, while later this gave way to shrub vegetation, possibly as a result of forest clearance.

Unfortunately, little evidence is yet published for the changes taking place during the past 8,000 years. Work in Dalmatia by Beug suggests a possible change to a warmer climate around 5600 BC (Wright 1968, 125) and work in Turkey hints at a change to a drier climate around 2000 BC. It is possible, then, that the climate was for a while warmer

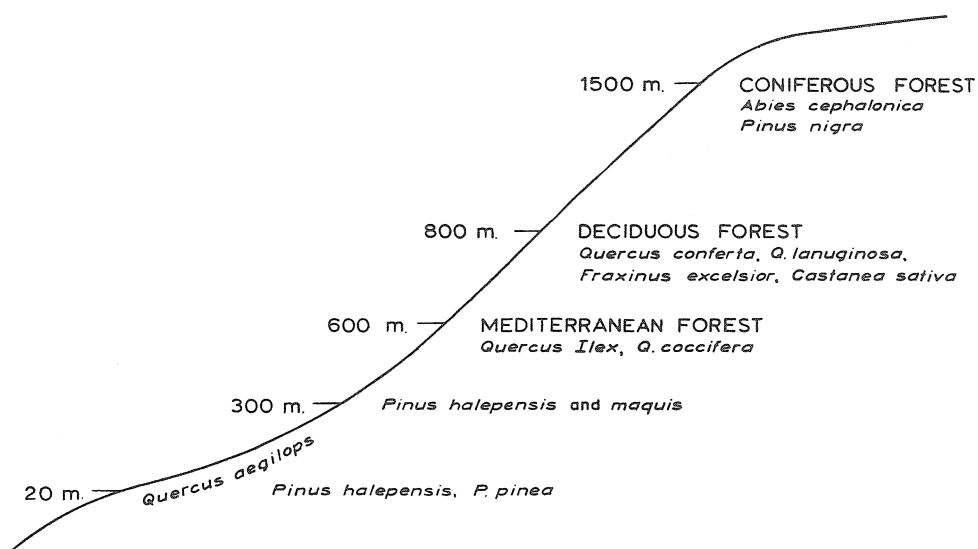


FIG. 15.1 Typical tree and forest zonation in the Mediterranean region (after Turrill).

and drier during this period. But there is as yet no evidence for any really marked climatic change during neothermal times. Wright's own work shows an increase in olive pollen near Pylos, from ca. 1000 to 600 BC, almost certainly culturally induced—but these dates do not correlate well with the archaeological record. Recent work in the Plain of Drama by Turner and Greig confirms the view that there was little marked change in neothermal times between the establishment of the post-glacial mixed oak forest and its rather recent destruction through human activity.

The overall picture, then, would seem to be the development of forest cover; at least in some areas, around 8000 BC, at the end of the Würm glaciation. This doubtless accompanied a rise in temperature. But since that time no significant climatic changes are yet attested. Such vegetational changes as seen are likely to be due at least in part to human activity.

Important evidence on the distribution of edible plants is given by the archaeological finds. Of the wild cereal grasses which were later domesticated, it seems that only

oats have been found wild (J. M. Renfrew 1969a, 160 and 166). But it is possible that wild Einkorn, *Triticum boeoticum*, and perhaps even wild barley, *Hordeum spontaneum*, are native to the Aegean (Harlan and Zohary 1966, 1075). Almonds and pistachio nuts (*Pistacia atlantica*) occur in very early deposits and were evidently wild locally, as were acorns, peas and vetch. Lentils are believed to be native to Greece: wild lentils are reported from early neolithic Thessaly (Hopf 1962; Milošević, Boessneck and Hopf 1964, 104), and are found as food plants in early contexts.

The wild vine is today widely found in the modified Mediterranean vegetation zone of northern Greece (Logothetis 1962), and finds of pips of wild grapes from levels at Sitagroi, dated to c. 4500 BC in radiocarbon years, confirm that in north Greece at least the vine was native. Olives have certainly grown in Greece since Classical times, and imprints of olive leaves have been found in volcanic deposits on Santorin which are considerably earlier than the 'Atlantis eruption' of c. 1500 BC. They are found in strata underlying deposits now dated to c. 12000 BC,¹ and it seems that wild olives were growing in the islands already in the late Würm period. The find of an olive stone, probably of the wild olive, at aceramic neolithic Souphli (Theochares 1958, 84) fits this conclusion. The fig is also believed to be native to Greece.

With the exception of emmer wheat and possibly barley, the wild progenitors of most early food plants were thus already available in the Aegean by 6000 BC. Flax however is not attested in the Aegean until the early bronze age.

The faunal environment of Greece has naturally changed considerably. During the late Pleistocene, as indicated by the finds at the Franchthi Cave, red deer was common, with fox, wild swine and wild bovinds. Presumably all these species will have survived into the post-glacial period. Certainly they are all attested at neolithic Sitagroi. There *Bos primigenius*, red deer, fallow deer, roe deer and wild swine are seen as well as wild cat, marten, badger, brown bear, fox, wolf, small carnivore, beaver, hare, tortoise and also birds. (Information kindly supplied by Dr S. Bökönyi of the National Museum in Budapest.)

Wild sheep and goat have not yet been positively documented from early prehistoric deposits in the Aegean and despite the presence of 'wild' (probably feral goats) on Crete and some of the Aegean islands today, these species may not be native to Greece (Payne 1968, 375). On the other hand, sheep or goats are reported from Upper Palaeolithic deposits at the Kastritsa Cave in Epirus (Higgs et al. 1967, 12) and a large caprine at the Franchthi Cave in the Argolid (Payne in Jacobsen 1969, 353). Horses are not documented in Greece until middle bronze age times (Milošević, Boessneck and Hopf 1962, 39), although there is a reported occurrence in central Macedonia during the early bronze age (Heurtley 1939, 88). There are earlier occurrences in Romania.

The marine fauna—fish, molluscs and other invertebrates—have not changed significantly in the past 10,000 years, although routes of seasonal migration for tunny may have altered, perhaps affected by small changes in sea level (cf. Evans and Renfrew 1968, 92).

¹ I am grateful for this information on the date of the strata containing olive impressions to Dr J. Keller of the Mineralogisches Institut der Universität Freiburg.

The non-organic environment has changed little over the past 10,000 years, and such changes as have taken place are chiefly of human origin. Deposits of copper, silver and gold have been worked out in many places. But otherwise the available resources must have been around 8000 BC very much as they are today.

During the Upper Palaeolithic period in Greece human occupation was apparently restricted to the mainland: there are finds from Thessaly, Epirus, Boeotia and the Peloponnese, but none so far from Crete or the Aegean Islands. In the Kastritsa Cave the most frequent remains were those of red deer and fallow deer with occasional equids, sheep or goat, and aurochs (Higgs et al. 1967, 13), and the seasonal movements of the hunters of 20,000 years ago have been discussed in this connection. We may imagine a hunting economy based chiefly upon deer, with some gathering of plant foods, none of which have yet been recovered. A very similar picture emerges from the Pleistocene remains in the Franchthi Cave in the Argolid (Jacobsen 1969, 353).

The Coming of Farming (phase II)

With the onset of neothermal times, the situation, as reflected at the Franchthi Cave, does not seem to have changed dramatically. Red deer bones form 75–85 per cent of the mammalian fauna, together with wild pig and fox. The wild plants recovered are almond, pistachio, peas and vetch.

At around 7000 BC a dramatic change occurs. Large vertebrae, probably of tunny fish, appear in considerable numbers, up to 50 per cent of the total bulk of bone recovered in some cases. The much greater meat/bone ratio of tunny compared to land mammals such as deer (Evans and Renfrew 1968, 79) suggests that tunny may well have become the principal component of the diet, at least during the season of the catch. A little later, bovid remains (*Bos* or bison) appear in significant quantities, between 10 and 20 per cent. The size is greater than in neolithic times, so that this may be a wild species. The plant remains recovered include almonds and pistachio nuts.

Man's effective environment at this time has been significantly enlarged by his exploitation of the sea. It is interesting that obsidian from Melos is now found at Franchthi, so that travel by boat from the Peloponnese to the Cyclades had become possible. Boats are also very useful in driving tunny fish inshore, prior to their slaughter. Perhaps small sea-going boats were now, for the first time, constructed.

The first farming sites show a very different picture. Most of them are open sites, potential tell mounds, often inland. And at all of them, in the early period, certain features are seen. Table 15.1 presents in synoptic form the subsistence data available from open sites of the Aegean early neolithic. In all of them, the plant deposits recovered, in which cereal grains predominate, show wheat rather than barley as the most abundant species. Deposits predominantly of lentils and of pistachio have also been found, and other species such as peas and vetch occur in smaller quantities.

The predominance of sheep or goat is seen also in the early neolithic deposits of the Franchthi Cave (c. 70–85 per cent) with pig, as usual, next in abundance (5–15 per cent) and cattle around 5–10 per cent.

The agriculture was thus, from the first, based upon cereals and pulses. In virtually every site yet excavated, wheat exceeds barley in importance. Generally it is emmer wheat, *Triticum dicoccum*, but einkorn, *Triticum monococcum*, is often present. At Knossos X, however, the dominant species is bread wheat (*Triticum aestivum*) a naked hexaploid wheat, which excepts the site from the general pattern.

The barley, which does not seem to have been anywhere the dominant crop at this time, was generally naked or hulled 2-row barley, *Hordeum distichon*. At Argissa hulled

TABLE 15.1 Data for the early neolithic subsistence at open sites in Greece. The number of deposits is given in which wheat or barley have been recorded as the predominant plant crop, together with information on other species found as predominant in other deposits, and species occurring in smaller quantities. Figures are given also for the principal animals species, as determined from the preserved animal bones.*

Site	Plant species				Animal species—%			
	Wheat	Barley	Other predominant	Other species	Sheep/Goat	Cattle	Pig	Wild
Argissa	1	0	Lentils	Millet	84	5	10	0.9
Sesklo	1	0	Pistachio	Peas, acorns	—	—	—	—
Souphli	1	0	—	Lentil, olive	—	—	—	—
Achilleion	1	0	—	Oat	—	—	—	—
Ghediki	1	0	—	Pea, lentil, vetch, pistachio	—	—	—	—
Nea Nikomedeia	✓	0	—	Lentil, pea, vetch	66	13	15	6
Knossos	1	0	—	—	74.7	6.5	18.4	0.4

*Data for Argissa from Milošević, Boessneck and Hopf 1962; for Nea Nikomedeia from Rodden 1965, 91 and J. M. Renfrew 1969a, 161; for Sesklo, Achilleion and Ghediki from J. M. Renfrew 1966; for Sesklo from Theochares 1958, and for Knossos from Jarman and Jarman 1968, and Evans 1968a.

6-row barley, *Hordeum vulgare*, is reported. Pulse crops, notably lentils, were clearly more important than barley.

Caprovines were everywhere the principal domestic animals: at Argissa and Knossos it was concluded that sheep greatly outnumbered goats. Although the matter is not conclusively demonstrated, they are generally felt to be domestic. At Knossos it was concluded that all the pig and cattle were domestic also. Indeed no wild cattle or pig are reported from the 'camp' levels there, and the domestication of these species must presumably have taken place elsewhere—perhaps in west Anatolia. *Bos primigenius* is, however, reported from the mainland, so that these two species may yet prove to have been domesticated locally in Greece.

This pattern of predominantly wheat cultivation in early neolithic Greece is closely reflected in the modern pattern (fig. 15.2). In parts of southern Greece today barley is the more intensively exploited (fig. 15.4, a). But the distribution of neolithic tell settlement in Greece shows a close correlation with that of modern intensive wheat cultivation. It correlates also with the region of modified Mediterranean climate and vegetation rather than with that of true Mediterranean climate and vegetation.

Clearly the first farmers of Greece, with what seem to have been their imported domesticates, were dependent on three essential components: wheat, pulses and sheep.

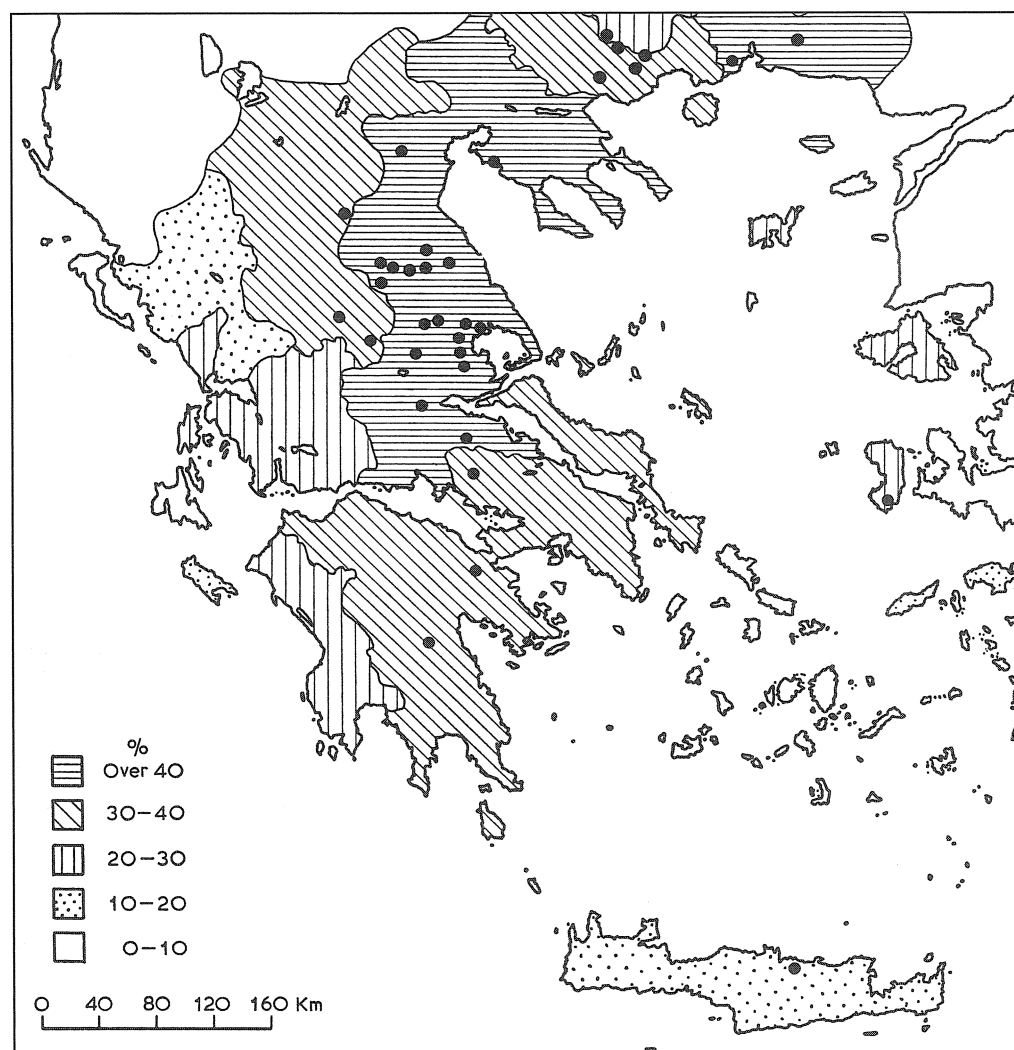


FIG. 15.2 The correlation between the distribution of neolithic tell sites and the wheat-bearing lands of Greece. The percentages indicate the proportion of land under wheat cultivation in each region of Greece. (Tell distribution as in fig. 14.1; data on wheat from 'Greece' 1944, II; Turkey not included.)

Only later do cattle and pig become as numerous. And this initial pattern was imposed even in the region of true Mediterranean climate where, as we shall see, barley cultivation later became more popular than that of wheat.

This pattern is very much that seen at the Near Eastern primary village farming settlements at about the same time. At Tepe Ali Kosh in Khuzistan during the Ali Kosh phase, for example, emmer was found in great abundance, followed by barley and einkorn, although wild seeds exceeded the domestic cereals. Sheep and goat were the domestic mammals; domestic cattle and pig were not yet found. A similar dependence on wheat (with barley), on pulses, and on sheep (with goat) is seen on other early neolithic sites in the Near East.

So far no Aegean site has been found belonging to a stage of 'incipient manipulation of potential plant and animal domesticates', such as is seen at Karim Shahr or early Jarmo, at Tell Mureybit and at Ali Kosh in the Bus Mordeh phase. On present evidence farming apparently reached Greece as a ready-formed culture complex: the only significant Aegean contributions in the early phase may have been the domestication of cattle and pigs. If these animals are indeed domestic at Argissa and Nea Nikomedeia, which has not been conclusively demonstrated, this is apparently a local development. Their Aegean domestication could conceivably precede that at Near Eastern sites. But the possession of these domestic species by the first inhabitants of Knossos, in the absence apparently of their wild counterparts, suggests that they may have been imported to Crete, already domesticated (like the bread wheat) from western Anatolia. As a hypothesis we may suggest an early centre of cattle and pig domestication in central and western Anatolia. If the early domestication of these species there can be documented, their early occurrence in Thessaly and Macedonia may require re-interpretation.

The new environment of these early neolithic farmers is thus essentially an *imported* one. While the pulses, cattle and pigs were in some cases available locally, the cereals and sheep and goats are apparently a human contribution to the Aegean scene. Here, then, we see perhaps the first major step in man's creation of his own environment. The first permanent settlements in built houses came at this time, and now the first ovens for parching the grain (and soon for the firing of pottery) are found. The life pattern of mixed farming, with wheat the dominant cereal, was now established on the fertile plains of central and northern Greece, where it has continued without interruption to the present day.

A whole series of new subsistence systems had been introduced, each with its own periodicity and its own specialist functions. For example, cereal agriculture brings with it this requirement for the parching of hulled grains to facilitate threshing. The oven is thus a basic element of agricultural technology, even before the invention of pottery. Ovens were indeed excavated at Nea Nikomedeia. The relative importance of these systems is well reflected in the settlement pattern: the great majority of tell mounds are concentrated in what are still the rich wheat lands of Thessaly and Macedonia (fig. 15.2). Clearly the population was able to depend upon a food supply potentially much greater than that available to its palaeolithic predecessors.

The uniformity of the subsistence pattern in the different regions of the Aegean at this early time is very marked. The gradual shift in the systems in some regions takes place in the succeeding period.

The Diversification of the Farming Pattern (phase III)

The domestic plants and animals introduced or exploited from around 6000 BC in Greece, formed from that time, and still form, the essential basis for the subsistence economy. The agricultural system was, however, modified in several significant ways during the succeeding three millennia. A detailed examination suggests that the changes which took place were neither sudden, nor made with deliberate foresight, but were the result of continual adaptation to the environment—which is itself changed by each adaptive change. This is a feedback system of continual and mutual man–environment adjustment. Many of the changes taking place were temporary ones. We shall see, for instance, continual permutations in the relative importance of the caprovines, cattle and pigs: the system was always a self-regulating one. But other changes, such as the gradual domestication of new species, were the result of positive feedback—of deviation amplification—as human interest facilitated the exploitation of new foods such as grapes, figs or beans, and as these established themselves as an essential factor in human diet.

The plant foods evidently remained the most significant. Three trends are obvious: diversity in the cereal species grown, increasing crop purity, and the exploitation of a new range of species.

During the first neolithic period, hexaploid wheat is reported only from Knossos, and 6-row barley from Argissa, where it was a minor component. During the later neolithic these species are seen on several sites and einkorn is sometimes a principal crop in its own right. Efficient recovery and systematic study of plant remains from pre-historic sites in Greece is something which has emerged only over the past decade, and there is as yet little detailed documentation for the changes taking place. The data from the site of Sitagroi in east Macedonia are taken here by way of example, since they give a clear picture based on more than 40 separate samples from each phase of occupation. Phase I is middle neolithic, phase V early bronze age, and the occupation extended over a period of more than 2,500 years.

The following provisional table is based on work and identification by Dr J. M. Renfrew (Table 15.2). The first figure gives the number of samples in which the species in question occurred, the second, the number in which it predominated (for very small samples no dominant crop is indicated).

These data are used in fig. 15.3, where the various species present are indicated in terms of the percentage of samples in which the species predominated. Weeds are excluded.

A number of significant changes occur, which are seen also at other sites and in other regions. The first evident change is the greater *diversity* in the exploitation of cereal crops.

In the early neolithic, emmer was the major cereal crop, with einkorn often present in lesser quantities. Einkorn is now frequently a crop in its own right in north Greece, and 6-row barley becomes important. For the late neolithic of Thessaly, four cereal deposits have been reported in detail, of which one is chiefly of barley and three are emmer (J. M. Renfrew 1966, 28). In parts of south Greece, indeed, barley becomes dominant during

TABLE 15.2 Food plants (excluding wild grasses and weeds) recovered from levels of the different phases at Sitagroi. The first figure in each column indicates the total number of *samples* in which the species occurred, the second figure the number of separate samples in which it was the dominant food plant. (For very small samples, no dominant crop is indicated.) Data from Dr. J. M. Renfrew.

<i>Species</i>	<i>Phase</i>				
	I <i>T:D</i>	II <i>T:D</i>	III <i>T:D</i>	IV <i>T:D</i>	V <i>T:D</i>
<i>Cereals</i>					
Einkorn	25:14	36:24	28:17	14:3	19:6
Emmer	25:17	34:9	22:4	15:3	17:1
Club Wheat	--	1:0	--	2:0	1:0
6-row Barley	6:0	17:2	19:3	14:9	16:5
Oats	1:0	--	1:0	1:0	--
Millet	--	--	--	1:0	--
<i>Pulses</i>					
Lentil	--	11:0	10:0	6:2	10:1
Vetch	8:1	8:0	22:10	9:3	32:22
Pea	2:0	9:0	5:0	--	--
<i>Fruits</i>					
Grape	1:0	4:0	8:0	3:0	2:0
Acorn	--	--	3:2	20:19	22:14
Cornelian cherry	1:0	1:0	1:0	3:2	--
Juniper	--	--	--	1:0	--
Almond	1:0	2:0	1:0	--	--
Pistachio	1:0	1:0	3:0	--	--

the later neolithic, as exemplified by the Cycladic sites of Saliagos (Evans and Renfrew 1968, 139) and Kephala in Kea. We see a growing diversity in the range of cereal crops, with wheat still predominating in the north but barley sometimes the main crop now in south Greece—precisely as in the modern distribution (fig. 15.4).

Among the other plants which were already seen, generally as minor components, in the early neolithic deposits, pulse crops (vetch, lentils and peas), as well as acorns and pistachio nuts, occur regularly now as the principal component in samples. The increasing diversity observed implies that pulse crops were deliberately cultivated.

The second major development is in *crop purity*, as Dr J. M. Renfrew has shown (1966, 30; 1969). For example, at late neolithic Sesklo, one deposit consisted solely of 1,000 grains of emmer wheat (Dhimini period), another of 315 grains (Rachmani pe-

riod), and yet another of 179 grains (neolithic/early bronze age transition), without the presence of other crop species or of weeds. This high purity contrasts markedly with an aceramic neolithic deposit from Ghediki containing 71 seeds, namely 44 of emmer, 2 of einkorn, 2 of hulled 2-row barley, 1 of naked 2-row barley, 5 peas, 4 vetch, 4 lentils and 2 pistachio nutlets. Of course not every sample recorded represents a crop as reaped: mixing may have occurred deliberately in the home. But the trend is clear.

Increasing crop purity represents increasing specialisation and a vastly improved agricultural competence. It opens up possibilities of further sophisticated advances such

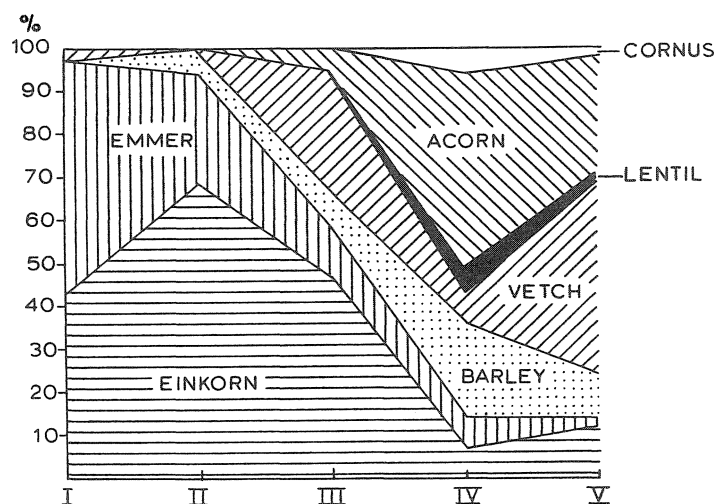


FIG. 15.3 The changing spectrum of agricultural production in the five successive phases of prehistoric Sitagroi, c. 4500 bc to 2000 bc (in radiocarbon years). The percentages indicate the proportion of separate samples recovered in which the crop in question predominated (based on data from Dr J. M. Renfrew).

as the rotation of crops (e.g. cereals then pulses) to regenerate the land. Very possibly the high proportion of deposits where vetch predominates is an indication of some form of crop rotation. If this were so it would appear to begin at Sitagroi during phase III, the chalcolithic period.

Perhaps the plough was first used at this time: we have no direct evidence for this, however, until the bronze age when one of the Minoan hieroglyphs may represent a plough (Hutchinson 1962, 241). The grain was stored in large pithoi. In one case at Sitagroi, from the end of the neolithic period, a considerable deposit of burnt acorns was found together with barley inside a complete pithos.

The third advance at this time, supplementing the greater range of crops from among the known species deliberately cultivated, and the greater crop purity, is the collection, and in some cases the cultivation, of altogether *new species*. Although the cereal range was established essentially in the early neolithic, beans (*Vicia faba*) are found for the first time at the very end of the neolithic period at Sesklo, and in the neolithic/early

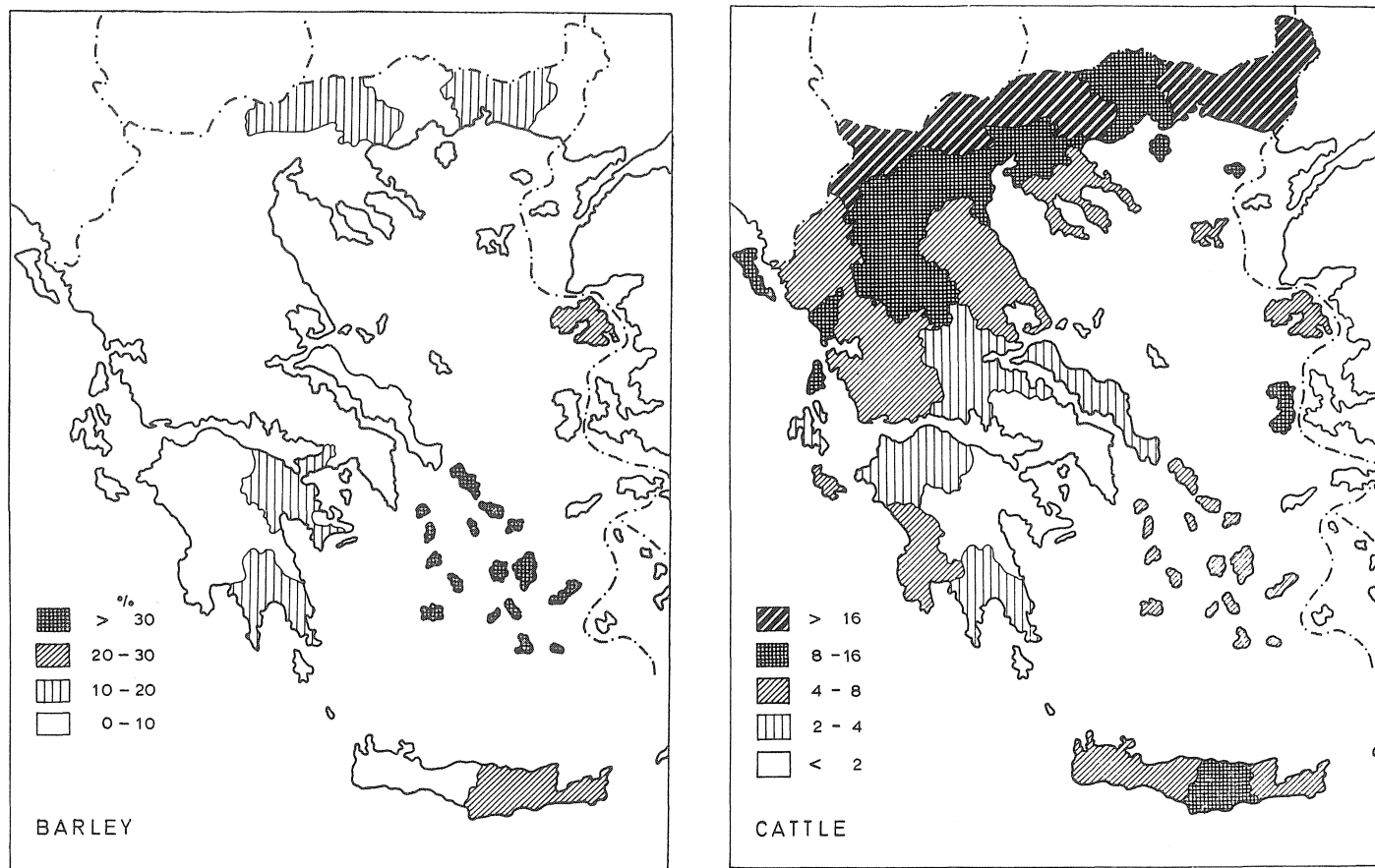


FIG. 15.4 The distribution of barley and of cattle in Greece in 1937. The proportion of land under barley is given as a percentage of the total cultivated land in each region; for cattle the figures represent the density per sq km in each region (after 'Greece' 1944, II). Note the clear distinction between southern and northern Aegean.

bronze age transition at Lerna (Hopf 1962, 4). This species, which is supposed to have developed from the wild pulse, *Vicia narbonensis*, available locally, constitutes a significant contribution to the diet at the end of the neolithic.

Still more significant, however, was the increasing *exploitation of wild fruit and berries*, including *Arbutus*, seen at Lerna, and the cornelian cherry so common at Sitagroi. Wild grasses and *Polygonum* were also collected, and grass peas (*Lathyrus*) were cultivated at late neolithic Kephala in the Cyclades. The great significance here is that this brought man into increasing contact with three species of considerable potential value: the vine, the fig and the pear. (Finds of olives are rare in the archaeological record: the single example from the neolithic of Greece is from the aceramic of Thessaly.)

Wild pears have been found at Dikilitash in levels datable around 3600 BC in radio-carbon years. Splendidly preserved figs were found at Rachmani (Wace and Thompson 1912, pl. 28, b) and they occur at Sesklo and Dhimini in Thessaly, at Dikilitash and Olynthos in Macedonia, as well as at neolithic Lerna in the south. Above all, the grape is found wild in several deposits both at Sitagroi and Dikilitash in the plain of Drama, from 4500 BC onwards. In the earlier phases at Sitagroi (I to III) these were wild grapes, but the increased dimensions of the pips, their narrower form and the greatly lengthened stems indicate that by the end of the neolithic (phases IV and V) they may be regarded as 'domesticated' in the modern sense (information from Dr J. M. Renfrew).

Here then we see the positive and lasting effects of increased diversification among the (then) wild plants as well as among domestic cereals.

Diversification and specialisation are seen too among the domestic animals. In the early neolithic levels at Knossos, following the aceramic neolithic occupation in the 'camp' levels, M. R. and H. N. Jarman have detected a fall in the population variability among the sheep population. The population age-structure changed first: 'There is a rise from the Camp to the Early Neolithic Ia of the percentage of species for animals killed in the first and second years, and a fall in the percentage which definitely survived three years. The Early Neolithic Ia and the Early Neolithic Ib economies therefore operated at a higher level of efficiency than the Camp, evidently being able to extract a greater yield of young sheep without prejudicing herd maintenance' (Jarman and Jarman 1968, 258). The mean size of the sheep fell also over this period: the chief variability fall occurred between Early Neolithic Ia and Early Neolithic Ib. Various explanations may be advanced to account for these changes: but at the least it seems reasonable to correlate the increased uniformity with greater human control over the flock.

The variation in animal species at Knossos from the time of the first settlement to the end of the Early Neolithic has been studied in detail (*ibid.*, 245). The caprini (sheep and goat) decline somewhat from their initial predominant position—from 75 per cent to 61 per cent. Pigs, which were numerous in the early phase, decreased in number—from 20 per cent to 14 per cent. But cattle, on the other hand, became considerably more important—rising in proportion from 7 per cent to 23 per cent. It has been suggested that these changes may be correlated with the developing reliance on milk products. This, if true, would add a further element to the diversity of the time.

The percentages of the various species present at Sitagroi in each phase, as determined by Dr S. Bökönyi, are seen in fig. 15.5. The total sample of identified bones was 33,000.

By phase I (c. 4500 BC in radiocarbon years), sheep and goat have fallen from the high proportion of c. 70 per cent seen everywhere in the early neolithic—for instance at Nea Nikomedeia. But cattle have become very greatly more important, just as they

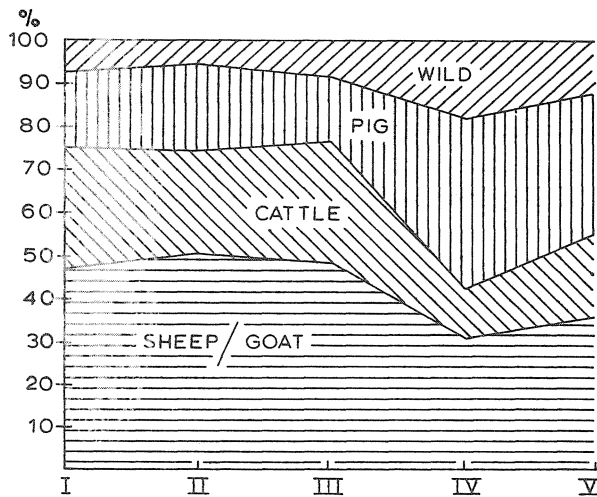


FIG. 15.5 The changing spectrum in livestock in the five successive phases at Sitagroi (c. 4500 bc to 2000 bc in radiocarbon years). Percentages are based on the total bones identified for each species (data from Dr S. Bökönyi).

rapidly did at Knossos. The other striking feature at Sitagroi is the great increase in pig and wild animals at the phase III phase IV transition—just when acorns became so abundant among the plants.

In Thessaly there was likewise a marked decline in the percentage of the caprini after the aceramic neolithic (Boessneck 1956), and a big increase in cattle, and the early and preponderant reliance on sheep and goat does not persist. It is interesting to contrast this with the situation at Saliagos near Antiparos where, around 4500 BC, the caprini still predominate (83 per cent) and cattle form only 3 per cent of the total (Evans and Renfrew 1968, 114; Dr S. Bökönyi, personal communication). Likewise in the middle neolithic levels of the Franchthi cave, sheep and goats still form 70–85 per cent of the total, with cattle merely 5–10 per cent (Jacobsen 1969, 351).

Already in later neolithic times, then, we see emerging a distinction between north and south Greece which persists today. South Greece lacks good meadow pastures for large cattle, and 'small cattle' (sheep and goat) predominate. Today cattle are intensively reared as a food source chiefly in north Greece (fig. 15.4, b).

The subsistence system is flexible and responds sensitively to local variations in the natural environment. It seems likely that already the modern system obtained in the south, where oxen are used principally for draught and not for beef (FAO 1947, 107). In the north there was a shift away from this situation to one where cattle had a primary role as a protein source, as they do today.

A further indication of new interests and specialisations is given by the new evidence for weaving in the late neolithic at Knossos (Evans 1964a, 233) which parallels that in the early bronze age of the north Aegean. Wool may have been the chief fibre: there is no evidence as to whether flax was cultivated in Greece in neolithic times.

Wild animals do not seem to have been a very significant component of the diet at this time except in Macedonia. Here considerable quantities of deer were hunted, at Sitagroi and at Kritsana. Arrow heads are scarcely found during the Greek neolithic (and not at all in the Cretan), although well-worked points occur at a number of sites, chiefly maritime, and may have been used for tunny fishing spears (Evans and Renfrew 1968, 84; Belmont and Renfrew 1964, 398). The sling stone was therefore the chief weapon for hunting, and finds are made at many sites during the neolithic (Childe 1951b). It is possible that the bow was not used in Greece until the bronze age.

Finally there is evidence of increasing exploitation of the sea. The Cycladic island site of Saliagos yielded a wide variety of mollusc shells, representing 37 species altogether. Tunny fish were intensively sought, as at the Franchthi cave some three millennia earlier, and it is notable that the stone points first seen in the Aegean around 4000 BC are especially common at both these sites.

During this long period of mutual adaptation, of experiment and diversification, the foundations were laid for the intensification and specialisation in the subsistence subsystem seen during bronze age times.

The Development of Mediterranean Polyculture (phase IV)

Greek civilisation, it has been well said, was ultimately dependent economically upon the 'Mediterranean triad': wheat, the olive and the vine. This was certainly true for the Minoan-Mycenaean civilisation, whose subsistence basis is discussed in the next section.

Although the evidence is very limited in extent, I believe the same can be said of the proto-urban expansion of the Aegean early bronze age. The evidence has previously been collected only by Vickery (1936), and with the recognition that this period was a crucial one for Aegean prehistory it takes on a renewed importance. The key advances at this time seem to have been the systematic exploitation of the olive and of the vine. These transform the basic cereal/pulse/stock picture of the neolithic, permitting a new flexibility in subsistence strategies, and opening the possibility of production specialisation in single commodities. The increase in settlement now seen, and the change in pattern, both discussed in the previous chapter, are related to this new exploitation.

AGRICULTURE

The principal change at this period in cereal cultivation, which was already well-established and diversified previously, is the shift from wheat to barley. Six-row barley is the principal crop reported from Thessaly, and it is the chief cereal at early bronze age Sitagroi. Just as today, in warmer and drier southern Greece barley was the dominant cereal—at Lerna III for instance, and Early Minoan II Myrtos. Wheat, but no barley, however, was found in the First and Second Cities of Troy (*ibid.*, 40) so that no overriding generalisation is possible.

A very marked feature of the Sitagroi finds is that cereal crops were found less often than pulse crops (notably vetch) and acorns. Beans, peas and vetch have been found also at various sites, including Troy, and Lerna, where lentils were also reported. Clearly all the crops already exploited in the later neolithic were utilised. At Lerna, linseeds occur for the first time (Hopf 1962, 4): while flax may have been grown to produce linen, the aim may have been to obtain oil from the seeds, a common practice in Egypt (Lucas 1962, 333) and elsewhere.

The apparent decline in the relative importance of cereal cultivation at Sitagroi may just possibly be due to some exhaustion of the soil. Alternatively it may reflect a marked increase in the collection of pulses and acorns without any diminution in cereal production, possibly accompanying a population increase. One may speculate whether the preference for barley as against wheat observed in bronze age Thessaly may not be related to similar factors, or again conceivably to a hypothetical change to a drier climate in the later third millennium referred to above. But there is far from sufficient evidence at present to substantiate either notion.

THE VINE

In recent years significant evidence has emerged to document the cultivation of the vine at this time. Preserved remains of grapes are very rare in archaeological deposits, partly because of the small size of the pip, and partly because the essential nutritive element—the juice—is often separated from the archaeologically less fugitive element—the pip before use. Sir Arthur Evans questioned whether wine was known at all in prehistoric Crete (1925–31, I, 19), but the direct evidence, as well as the indirect, is now very persuasive that it was.

Recent excavations at Sitagroi have yielded numerous grape pips, which in the early levels are certainly of the wild vine. By phase IV, before the onset of the early bronze age period, the size and shape of the pip indicates that the vine may then be regarded as ‘domesticated’. We thus have the unique opportunity of observing the evolution of a domestic plant from its wild prototype in the successive levels of a single site. It is possible that the very numerous one-handled cups, which make their appearance at Sitagroi and indeed throughout the Aegean at this time, were used for imbibing wine.

In southern Greece finds of grape pips have been made at Myrtos in Crete, and in levels of Tiryns culture at Lerna. Several impressions in pottery were found from the time of the preceding Korakou culture (Hopf 1962, 10). Dr Hopf has compared their shape with those of the wild vine (*Vitis silvestris*) and the domesticated (*Vitis vinifera*) and concluded that they range from undoubtedly cultivated to undoubtedly wild in form. The process of domestication was evidently not complete. She suggests that this domestication did not take place in the Peloponnese, and indeed the distribution of wild vines today is chiefly in northern Greece. On the other hand, the modern map of grape production for the Aegean shows that the south now predominates (fig. 15.6). It is curious that the distribution of wild vine and modern vine exploitation should be so different as to be almost complementary. But in any case it is clear that in the early bronze age the grape was already used in the south. In view of the Sitagroi vine domestication sequence it is not necessary to follow Helbaek (1966, 122; and cf. 1962, 181) in seeing viticulture introduced from Egypt or the Levant. The grape is now documented wild in Greece before its domestication elsewhere.

The discovery of grape pips in the bottom of a pithos belonging to the Korakou culture at Aghios Kosmas is especially interesting (Mylonas 1959, 39 and fig. 132). The pithos had a small exit hole and spout at the base, and was evidently intended to hold a liquid, which can clearly have been either grape juice or wine (cf. Fig. 18.3, 8). The pithos had been repaired with lead rivets, and symbolises the two key advances of the period: Mediterranean polyculture and metallurgy.

The essential processes of wine manufacture are very simple. First the grape juice has to be expressed from the grapes, which is most easily done by pressing with the feet, standing upright in an open vat, from which the juice runs into a convenient container. Such a vat was indeed found in the Early Minoan II village of Myrtos (Warren 1968) and a whole wine-producing complex at Late Minoan Gournia and at Vathypetro (pl. 15, 2). Hutchinson (1962, 242) regarded these as olive oil separators, which is entirely possible: indeed the one at Vathypetro, on a pedestal, would not be convenient for treading grapes. Very possibly these vats were used for both purposes.

The grape juice has then to be stored in jars or vats for the fermentation to take place, which occurs in the space of a few days. If the sugar content were sufficient, an alcohol content of about 14 per cent might be reached. During fermentation these jars would be unstoppered. But when the fermentation was complete it would be essential either to stopper them or to transfer the wine to jars which could be so stoppered, in order to prevent acetous fermentation, and the formation of vinegar. In Egypt, leaf, earth and straw, sometimes with resin, were used to seal the jars (Lucas 1962, 18), and so it does not follow that the stoppers would be preserved in the archaeological record.

Here, however, lies a good functional reason for securely sealing jars, quite apart from the need to prevent evaporation or theft. Many of the sealings from the House of the Tiles at Lerna were on the necks and mouths of jars (Heath 1958), and it is tempting to relate this to the grape impressions from the same period.

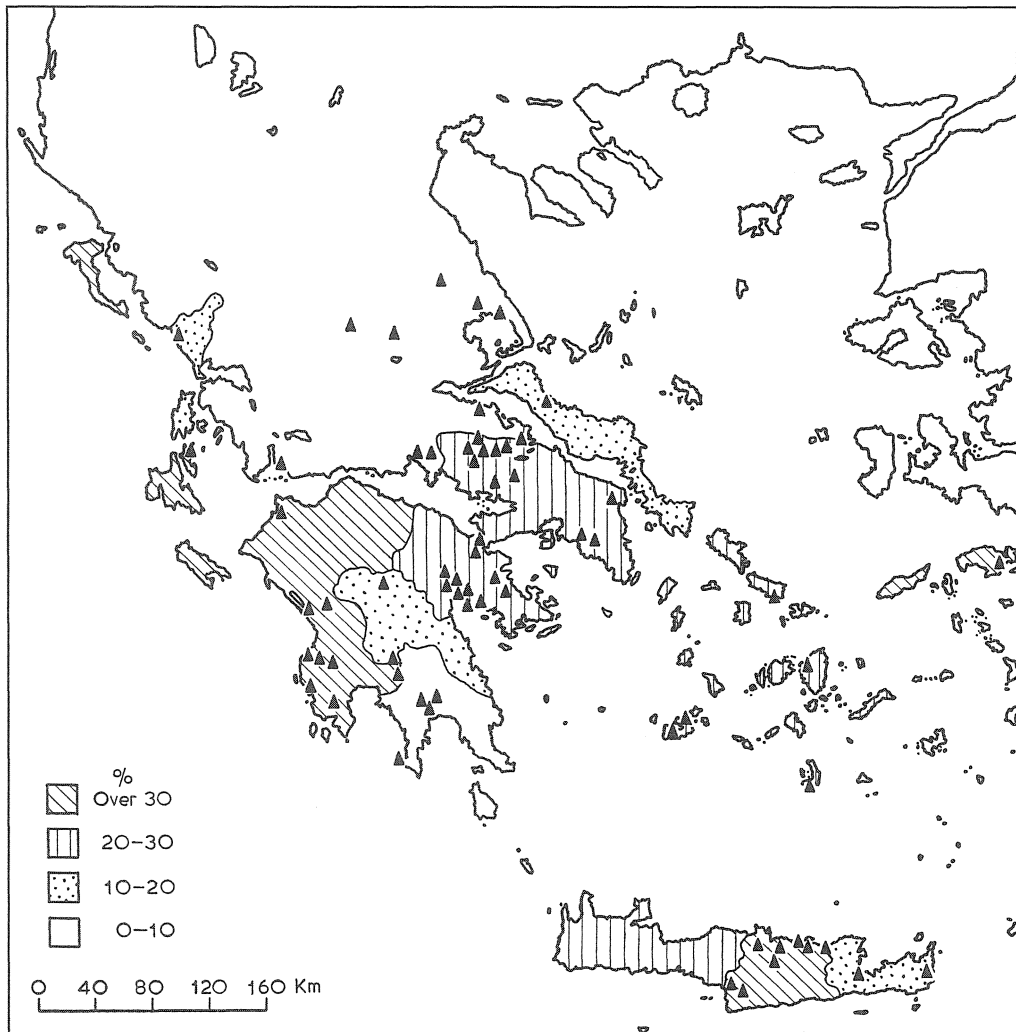


FIG. 15.6 The correlation between the distribution of major Minoan-Mycenaean sites and viticulture in Greece. Triangles indicate major late bronze age sites (as in fig. 14.1); percentages indicate the proportion of land in each region today given over to the cultivation of vines (data from 'Greece' 1944, II; Turkey not included).

Corroboration for the use of a beverage such as wine comes from the numerous cups and jugs which now, for the first time, appear in the archaeological record. Some of these cups are too small to contain even a modest draught of beer (pl. 16, 1), and distillation was a process unknown until Classical times. The 'ouzo cups' which were so frequently found at Lerna during the Tiryns culture find their sequel in the ubiquitous conical cups of the middle bronze age, so common at Aghia Irini in Kea. They in turn are superseded by the stemmed goblet and ultimately the kylix of the late bronze age.

The 'ouzo cups' and conical cups were too small to be useful for much besides drinking, and it seems reasonable to associate their sudden popularity with the emergence of a new beverage. It has indeed already been pointed out that one-handed cups are a *Leitmotiv* of the Aegean early bronze age, being found in numerous contexts in the Korakou and Keros-Syros cultures, as well as at Lebena in the Early Minoan I period and at Sitagroi in the early bronze age levels. The form occurs in silver in the great treasure of the Second City at Troy. And indeed the famous *depas amphikypellon*, so common at Troy from the time of the Second City, and known also in silver (pl. 19, 1), must undoubtedly also be a drinking cup, since it cannot stand upright but must have been held until emptied.

I believe that the ubiquitous 'sauceboat' of the Korakou and Keros-Syros cultures was also a drinking cup (although its use as a lamp has been suggested (Mylonas 1959, 25). The spout clearly indicates that it was made for use with a liquid: it may be the west Anatolian counterpart of the eastern Aegean *depas* cup. The distribution of finds in mainland Greece (fig. 20.5) compares closely with that of modern wine production. A number of finds in the graves on Levkas may here be significant.

The great increase in vessels for pouring liquids at this time is very striking. Certainly spouted vessels are found, although rather rarely, through the neolithic period, when milk and beer were obviously drunk, as well as water. But the 'teapot' is an Early Minoan invention. And above all, the jug, which is a closed form, can easily be stoppered.

The jug makes its appearance throughout the Aegean at the onset of the early bronze age. Significantly perhaps its occurrence in the north, in the Poliochni Blue phase, may antedate that in the south—which fits in well with the conclusion that the grape was first domesticated in the northern Aegean. The jug is enormously common in Early Minoan Crete, in the Keros-Syros culture in the Cyclades (although not earlier) and in the Korakou culture of the mainland. It is nowhere found in the Aegean neolithic. Suitable equally for olive oil and for other liquids, it must frequently have contained wine. The 'duck vase' of the Phylakopi I culture, which could easily be stoppered, was also clearly designed to hold a liquid.

If these arguments be accepted, the wide and rapid distribution of jugs and cups through the Aegean at this time is an indication of the entirely understandable popularity of the innovation, and the rapidity with which it spread.

A further interesting point is the sumptuous magnificence of the metal versions of these jugs and cups. The gold 'sauceboat' from Arcadia (pl. 19, 3) and the silver *depas* (pl. 19, 1) can be set beside the treasures of Troy or the golden jug of Alaca Hüyük. A remarkably high proportion of the gold and silver plate from Troy was clearly related to pouring and drinking. There can be no doubt that wine had achieved an enormous popularity by the late bronze age, as the finds described in the next section clearly show. It does seem reasonable, therefore, to suggest that many of these objects were fashioned for princely inbibulation. Indeed the treasures of the early bronze age Aegean already show the fascination with those two topics which preoccupied the prehistoric princeling, from Troy to Mycenae, and from Etruria to the Celtic lands: warfare and wine.

THE OLIVE

Finds of olives are in general very few in Greece. The single stone, possibly of a wild olive, from aceramic neolithic Souphli in Thessaly has already been mentioned. This, in conjunction with pollen evidence and the olive leaf impressions from Santorin suggests that the olive already existed wild in Greece.

The important find of an olive stone was made in Hood's excavations at the Royal Road, Knossos, in Early Minoan I deposits, and a further example has been identified from the Early Minoan II period at Myrtos (Warren 1968, 25). Still more significant, olive oil was reported from a jug in a grave of the Keros-Syros culture in Naxos (fig. 15.7, 3). Soil from within this small jug, 8.5 cm high, was examined for the excavator, Klon Stephanos, by Professor K. Zengelis and found to contain traces of olive oil (Stephanos 1906, 88; cf. Papathanasopoulos 1962, 118).

The capital importance of this find is emphasised by the presence of two lamps from the same grave, the whole complex documenting, as Stephanos (1905, 220) was the first to point out, the earliest certain use of olive oil in the Aegean, and perhaps the earliest in the world (fig. 15.7).² One lamp was of marble, with a central depression to contain the oil and three marble prongs to support the wick. The pottery lamp is much more elaborate, consisting of what are effectively three miniature sauceboats standing on three legs, which are inserted into a ring base. Holes between the three containers ensured that the liquid was at the same level in each as in the others. In this important tomb group, then, in addition to a 'sauceboat', a drinking cup and a splendid jug with matching decoration, probably for wine, we have two lamps and a small jug containing remains of olive oil. The importance of these two precious liquids, both perhaps of relatively recent innovation, is admirably symbolised in this tomb furniture.

The preparation of olive oil is a simple matter. The olives are first harvested by beating from the tree with flails. The famous 'Harvester Vase' from Late Minoan Aghia Triadha in Crete (pl. 27, 3) gives a wonderfully vivid impression of the workers with their flails returning joyously from the olive groves. After harvesting the olives were drenched in hot water, and pressed to extract the oil. The oil was separated from the water in a vat, from which the water was first drawn off. Such separating vats, which as mentioned above may in some cases have been used for treading wine, are known from Early Minoan II Myrtos, from Gournia, from Vathypetro (pl. 15, 2) and from Palaikastro. The oil was then stored in jars, which unlike those containing wine, need not necessarily have been sealed.

The three chief uses of the olive are as a food (especially for cooking), for hygienic purposes (to clean the body), and for lighting. There is no unequivocal evidence for the use of perfumed oil before the late bronze age, but already in the early bronze age, as we

² Zeuner's suggestions of early olive oil importation (Singer, Holmyard and Hall 1954, 359) are not supported by Lucas (1962, 333). Helbaek (1962, 182) has surveyed the evidence which suggests that olive cultivation began in the Levant at about the same time.

have seen, lamps are found. Prior to the production of olive oil, it is likely that animal fats were burned to produce light. But significantly it is in the early bronze age that lamps are first positively recognised.

A clay lamp, a little spouted bowl blackened by fire, was found by Tsountas in a grave at Chalandriani in Syros (Tsountas 1899, 94 and pl. 9, 27). Among the little footed marble bowls from the same cemetery, which are doubtless cups, are several small spouted ones (*ibid.*, 99 and fig. 27), one of which was found in grave 347 together with the clay lamp. These are probably also lamps.



FIG. 15.7 Wine and oil in the third millennium Cyclades. Oil lamps (no. 1 of marble, no. 2 painted pottery) and jug containing olive oil (no. 3) from a grave in the Spedos cemetery, Naxos. Nos. 4 to 6 may have been used for the service of wine.

Rather similar to these are the clay lamps of the Early Minoan period from Koumasa, both of which showed signs of burning (Xanthoudides 1924, pl. xx, 4170–71). In Crete, however, the wick was usually supported on a long prong extending sideways from the body of the vessel containing the fluid (*ibid.*, pl. xxxvi, 5015; pl. xxxvii, 5091–93 for Aghia Eirini and Porti). In Middle Minoan times the lamp was sometimes set on a higher pedestal (*ibid.*, pl. xxxvii, 5094 from Porti). The traces of burning on these examples clearly substantiate Persson's claim (1942, 102) that this form was a lamp with 'stick handle', which like 'scoop lamps' have sometimes been wrongly identified in the past. The graves at Mochlos have yielded a number of stone receptacles of this shape which were most probably lamps (Seager 1912, fig. xviii.a and fig. xxi.3). None has yet

been recognised from Early Helladic deposits—the ‘sauceboats’ seem too large to have served such a purpose. But possibly a floating wick was used in a simple small bowl.

The essential point here is that in many cases in Crete and the Cyclades vessels have been found during the early bronze age—for the first time—which can reasonably be identified as oil lamps. They tend, then, to substantiate the limited palaeoethnobotanical evidence that this was the period when olive cultivation first became widespread in the Aegean.

ANIMAL RESOURCES

No very significant change is visible in the animal husbandry—although very few faunal collections have yet been properly described. The leading role of the three basic species, sheep (with goat), cattle and pig, is unaltered. Pigs were especially numerous at Sitagroi (fig. 15.5), while in Thessaly cattle were established in the early bronze age as the dominant species (Boessneck in Miložčić, Boessneck and Hopf 1962), and, as at Sitagroi, wild animals played a more important role than they had done in the neolithic period. Cattle were likewise important at Troy II (Gejvall 1937–39). In the later part of the early bronze age at Troy the proportion of wild animals increased markedly, notably fallow deer and red deer, while cattle breeding decreased somewhat. The automatic domination of sheep and goat among the faunal analyses is gone, although these were still the most frequent finds at times.

Large flocks were doubtless kept in many areas: a charming bowl from Palaikastro from the very end of the early bronze age, gives a graphic illustration of this (pl. 24, 2). Probably sheep were being exploited for their wool: the development of specialised textile production is discussed in chapter 17.

Bees had doubtless been important to the economy for their honey from neolithic times or indeed earlier. The bee is seen now on seals and sealings, for instance at Lerna. Conceivably the seals may at times have been used to stamp consignments of honey. From the beginning of the Middle Minoan period come the superb golden bees from Mallia (pl. 18, 4). A charming little pottery figure from the Keros-Syros culture of the Cyclades shows a seated animal, which must surely be a bear, supping from a bowl (pl. 16, 2). It is tempting to imagine him guzzling honey, or perhaps mead, the beverage made from it, the Greek *μελίκρατον* or *ὕδρόμελι* which is likely also to have been produced in prehistoric times (cf. Forbes 1957, 96).

STORAGE

The adequate storage of food supplies is an important feature of a developing subsistence economy, and there is evidence that such storage now became more systematic. Of course, any economy based upon cereal agriculture must have an efficient way of storing grain between the harvest and the subsequent sowing, and of storing the bulk of the harvest until it is to be eaten.

There are several ways of storing grain: in pottery jars or other such containers; in dry pits constructed for the purpose; in special built granaries; or simply in dry rooms suitable for other purposes also. In every case the two chief problems to be overcome are damp, and the action of rodents.

Doubtless the first and last of these methods have been in practice since the advent of farming: the grain- (and acorn-) filled jars at Sitagroi IV give a typical example. It is at this time, however, that *bothroi* (storage pits) have been recognised as a notable feature of the archaeological record. Hutchinson (in Lamb 1936a, 61 f) discussed in detail the *bothroi* at Thermi, which were clay-lined, and cited comparable finds at bronze age sites in central and south Greece as well as in Anatolia. He concluded that the larger of them were probably constructed as grain silos.

At this point must be mentioned the remarkable 'hypogeum' underlying the south entrance of the Middle Minoan II palace at Knossos (fig. 6.9). Evans (1929–35, I, 104) dated this to the Early Minoan III period (although Pendlebury would set it in the succeeding phase (1939, 80), and regarded it as an earlier entrance to the palace. This seems a strange function for the large underground chamber: Hutchinson (1950, 206) very reasonably regarded it as a storehouse, and perhaps it may represent a massive silo.

No built granaries have been reported from the neolithic period of the Aegean, unless a small circular building at Saliagos (Evans and Renfrew 1968, pl. VII) served this purpose. But from the early bronze age we have the 'Rundbauten' of Orchomenos; perhaps even the large circular building at Tiryns (fig. 7.5) may have been a grain store. The most suggestive evidence is the chlorite schist model, said to be from Melos, which (pl. 15, 1), with its separate compartments and the legs that raise it above the ground, probably represents a granary (cf. Marinatos 1946).

None of this is conclusive, perhaps, but taken in conjunction with the House of the Tiles sealings, it gives a picture of a subsistence system expanding, not only in terms of the range of cultivars, but in the organisation of their exploitation. The new occupations called into being a whole new technology—for instance in the production of metal drinking cups. In systems terms, the subsistence and social subsystems are interacting and again the feedback is positive.

Subsistence in the Palace Economies (phases V and VI)

The abundant evidence yielded by the palaces of Crete and Mycenaean Greece indicates clearly how important food storage and the controlled supply of subsistence commodities were to the palace. The buildings themselves, and the evidence of the written records, document a high level of centralisation. Yet this centralisation seems no more than an intensification of the system already functioning in the previous period at Lerna, at Tiryns perhaps, and indeed at Myrtos. The essential basis, the range of foodstuffs, is

not significantly altered. We do see, however, a further increase in the role of wine in society, reflected in the splendid equipment for the Minoan-Mycenaean *Symposium* (fig. 21.2). And a commercial trade, probably in olive oil, now develops.

FARMING

Hulled 6-row barley was again the principal cereal crop in Thessaly, together with some emmer. The interest in pulse crops, especially beans (*Vicia faba*), seems to have increased markedly (J. M. Renfrew 1966, 33). Grape pips have been found at several deposits at Iolkos, and olive stones also. These observations are supported by numerous finds in Crete, mainland Greece and the island of Thera (Vickery 1936, 55 f). And 'pre-Greek' names for various other vegetables of lesser importance suggest that they were known already during the late bronze age, if not well before. Model fruits have been interpreted as representing the plum and the pomegranate (ibid., 80), and there are representations of many plants in Minoan art, especially of the olive. The date palm is also seen in late bronze age art and may have been introduced at this time (Evans 1925-31, I, 254; II, 493; Vickery 1936, 60).

Vivid representations of the whole range of domestic animals are also seen, although they add little to what is already known. An important addition to the range of species is the horse, bones of which are found from Troy VI (Gejvall 1937, 84). Horse-drawn chariots are seen on the stelai of the Shaft Graves at Mycenae (fig. 18.7), but this innovation was more significant for transport and for display than for food.

The hunt was, in late bronze age times, more than an energetic way of supplementing the food supply in slack farming periods. It became now an aristocratic sport, and as such is shown on frescoes, on seals and even on dagger blades. The Tiryns boar hunt fresco shows men and women hunters, some on chariots, with spears, bows and nets. Deer, wild goats and various birds were all hunted. Lions are frequently seen in hunting scenes. Gejvall reported leopard bones from Troy VII and lions in Troy VIII and IX (1937-38, 54; 1938-39, 5). Lions were apparently hunted in Thessaly and Thrace in classical Greek times, so that probably these lion scenes reflect a real if occasional hunting practice (in central Greece if not necessarily in Crete) in Mycenaean times. The bow is well documented in the late bronze age, both from representations and from finds of undoubted arrows (Buchholz 1962). As in mediaeval aristocratic society, the technology of the hunt and the technology of war were basically similar. A liking for one often inspired a liking for the other.

Artistic representations now document more fully also the exploitation of the sea, a major food source even before neolithic times, as the Franchthi cave finds show. The 'Fisherman Vase' (pl. 16, 3) from Phylakopi reminds us that fishing may have been a specialised occupation; fishing tackle was found at Gournia (Boyd Hawes 1905, pl. 4, 43), and fishing spears at Dendra and Mycenae. Octopus and squid are a common motif in Late Minoan art, and eels, flying fish and tunny fish are also represented.

However, the essential range of species, domestic and wild, was already available in the previous period. The palace economies show a change not so much in the selection of domesticates exploited, as in the manner and organisation of the exploitation.

WINE

Wine was clearly more than an agreeable beverage: it had become a drink of key social importance, undoubtedly also with religious significance. Wine appears as a ration (or offering) in the Linear B tablets (Ventris and Chadwick 1956, 308), often in the ratio of 2 litres of wine to 12 litres of barley. The impact which it had is reflected in the grave goods of the Mycenaean period. In the Tomb of the Tripod Hearth, for instance, in the Zapher Papoura cemetery near Knossos, were found 14 bronze vessels (fig. 21.2) including jugs, cups, a ladle, various pans and a cauldron used to heat liquids, possibly for the mulling and mixing of wine.

Two pottery groups from Milatos in north Crete give an even clearer picture of the preoccupation with wine (Evans 1905b, 486 and fig. 105). Quite clearly, the entire wine-serving equipment of the deceased was buried with him, taking a prominent place among his principal possessions.

Abundant finds from mainland Greece confirm this picture. Perhaps the most compelling is the enormous pantry of wine cups excavated at Pylos: 500 kylikes were found lying together. Whether this be interpreted as a store for domestic use or for trade, it certainly emphasises the preponderance of the kylix among ceramic forms of the time. Widespread trade in wine is suggested by the finds of Mycenaean drinking cups, both rhytons and kylikes, at numerous sites in the Near East, in Egypt and the west Mediterranean. Wine had become a product of considerable economic and social significance.

OIL

Olive oil had assumed an important position also. Its significance as a food must certainly have been fully appreciated: the Linear A and B tablets document transfers of olive oil as well as olives for both of which there are ideograms.³ In many cases the records are clearly of rations. The role of oil for lighting is suggested by the increased number of lamps found. Some of these are of stone, on high pedestals (Persson 1942, 105), others of a more portable nature.

The use of oil for toilet purposes is less easy to document directly. Spices, namely anise and coriander, were found in Late Minoan remains on Thera (Vickery 1936, 51) and while these are edible, and doubtless condiments, other plants may well have been collected for their perfume. Certainly the Ventris decipherment of the tablets speaks of

³ The identification of the two ideograms for olive and olive oil is partially dependent upon the Ventris decipherment of the Linear B script, although that for olive oil had previously been suggested (Ventris and Chadwick 1956, 19).

'unguent boilers' (Ventris and Chadwick 1956, 224), and it seems altogether likely that olive oil was perfumed with sweet-smelling herbs.

Alabaster (which may have contained ointment) and stirrup jars are found with a wide distribution in the Mediterranean (fig. 20.7; Stubbings 1951; Taylour 1958). The smaller jars in particular may have held perfumed oil, popular in the Ancient World as an aid to hygiene, and of course a more precious commodity than simple oil, making a more rewarding cargo to the merchants.

It seems likely that the export trade in Mycenaean pottery developed together with the trade in precious commodities which these pots contained: the simpler vessels, such as stirrup jars, would hardly be traded empty. We see, therefore, a positive feedback in the agriculture, craft and trading system. The development of olive oil yielded a commodity making profitable a trade with the Levant, Egypt and Italy. This in turn stimulated the commercial production of pottery containers. Equally, the growth of the trade, and the wider market which it brought, encouraged the commercial and specialised production of oil and unguent. This is, of course, no more than a classic instance of a production and trading expansion. But it is again crucially relevant here in documenting the increasing diversity and specialisation of the economy, which indeed created and sustained Minoan-Mycenaean civilisation.

STORAGE

All the palaces set aside considerable areas of the ground floor—as well, possibly, as of the first floor—for the storage of foodstuffs. This is most clearly documented by the large pithoi at Knossos (fig. 15.8), which Evans felt must have contained oil, since grain was not found in them (although we would, in fact, only expect preservation of such grain had it been carbonised by fire). The great magazines of Quartier XI to the east of the central court at Mallia (Chapoutier and Demargne 1942, pl. 1) held vessels of various shapes, some of the tall and wide pithoi containing carbonised wheat and lentils (Chapoutier and Charbonneaux 1928, 38).

Sometimes the grain was held in unbaked clay bins, as for instance in the East Basement of 'The Granary' at Mycenae, where some had fallen from an upper floor. Wace reported (1923, 48) finding 'vessels in shape like small tubs, about 0.70 m high and 0.50 m in diameter, with thick walls of unbaked clay, well mixed with chaff. Vessels of this type of unbaked clay are still in use in the villages of the Argive plain for storing grain and other produce or household goods and are called *kostelles*. In the remains of these store vessels—some were found also in the basement itself—were carbonised grains such as vetches, barley and wheat.'

In other cases the grain was probably just heaped on the floor, without any container, as often happens in Greece today. There is evidence from Knossos and Phaistos that grain was stored in this way on the first floor, the 'piano nobile', perhaps in order to avoid damp. At Phaistos a great pile of grain was found above floor level in Corridor 26 of the Magazine Block (Graham 1962, 129) and a similar find was made in Magazine 111

at Knossos. Grain bins were identified at Nirou Chani (Graham 1962, 134), and while no granary is reported from Pylos, the small circular Room 87 to the north of the palace may have served as a grain store, as also some of the pithoi.



FIG. 15.8 Large pithos for the storage of grain, wine or oil, from the tenth magazine at the palace of Knossos (*after Evans*). Ht 1.43 m.

The most impressive evidence, however, comes from Mallia, where at the south-west of the palace a large room was found containing great vats or cisterns of diameters from 3.70 to 4.0 m (fig. 15.9; Chapoutier and Demargne 1962, pl. i). These had a pillar in the centre and were probably domed. As Graham points out (1962, 135), the fact that they were built above ground makes it unlikely that they were cisterns: 'their correct interpretation is surely indicated by their resemblance to contemporary Egyptian granaries'. The similarity with the model from Melos (pl. 15, 1), described above, is very striking: the Mallia palace granary was of a type seen already in the early bronze age of the Cyclades—perhaps the counterpart at Mallia of the great 'hypogeum' at Knossos.

The evidence for the storage of oil and wine in the palaces is abundant, although it is not always easy to decide whether wine or oil was being stored. The 'House of the Wine Merchant' at Mycenae, for instance, is so named on the basis of the find there of a colossal pithos and of storage jars; yet while it may well have served as the palace wine store, the failure to find traces of oil in the stirrup jars does not exclude its possible use as an oil store.

The magazines of Quartier XI at Mallia, to which reference has already been made, showed a carefully planned device to avoid the wastage of liquid (fig. 15.9): each of the six bays had its bench on both sides for standing jars, with drainage furrows running

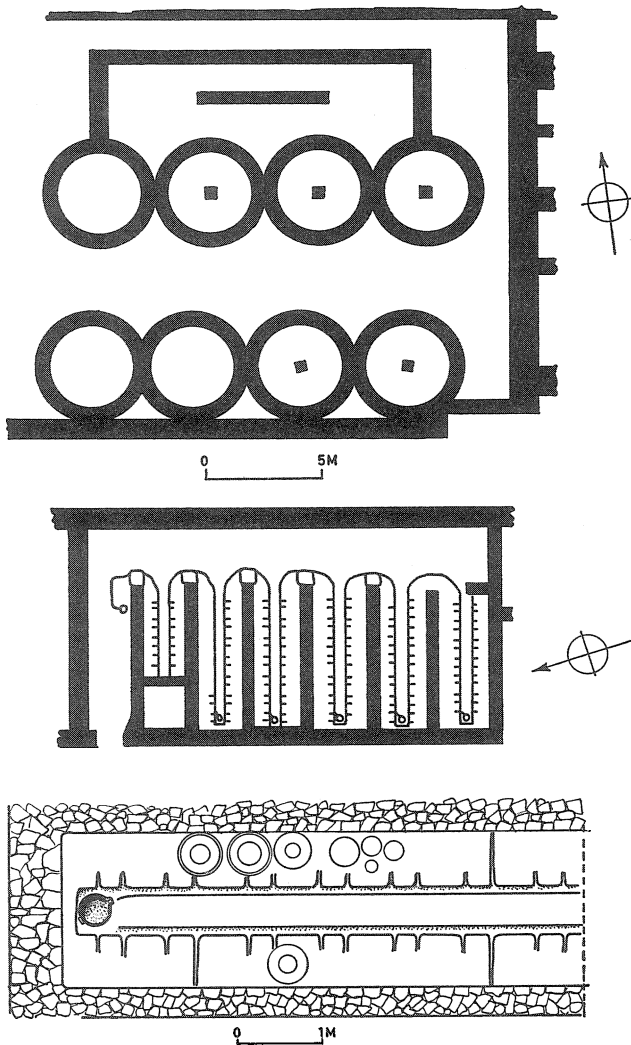


FIG. 15.9 The storage and processing of food at the palace of Mallia. (Above) granary building; (below) the oil store, with a detail of one of the bays showing the drainage channels (cf. fig. 4.4) (after Chapoutier and Demargne).

transversely to two central channels, which themselves emptied into a jar sunk into the floor. At Phaistos, one of the storage jars in the Middle Minoan magazines, north of the entrance, contained grape pips (Hutchinson 1962, 193).

At Mycenae a similar, although smaller, storage space was found in the so-called 'House of the Oil Merchant' which Palmer rightly believes to have been a palace annexe (1965, 114). One room contained 11 large pithoi and had an oval sump in the centre of the floor (Wace 1953, 3 and 10). Thirty large stirrup jars were found, 'the clay of many of these ... clearly heavily impregnated with oil'. Many of the jars had been stoppered with clay and sealed. There is no doubt, therefore, that this building was concerned largely with the storage and handling of olive oil. The arrangements reportedly made for heating one of the vessels suggested it may partly have been used for the manufacture of unguents.

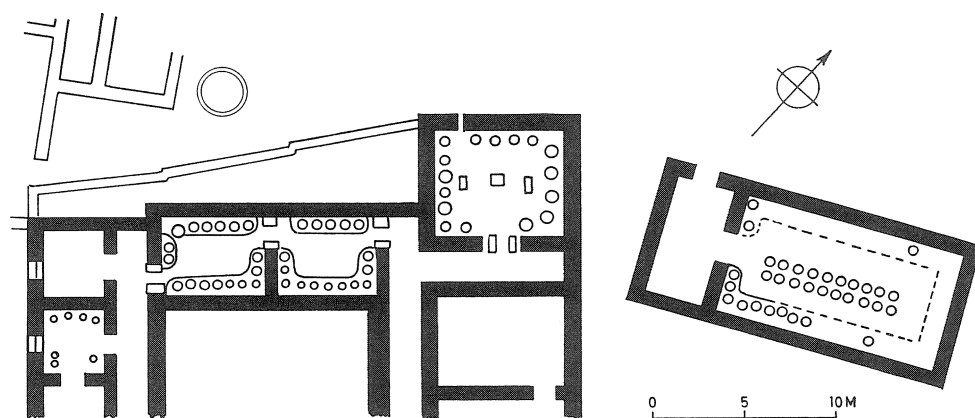


FIG. 15.10 Wine and oil at Pylos. The north-east quarter of the palace, showing the oil magazine (left), the 'wine magazine' (right), and (centre) Room 27, also containing pithoi. The circular structure to the north may be a small granary (after Blegen and Rawson).

At Pylos, four rooms at the north of the palace were given over to the storage of liquids (fig. 15.10). Two of these (rooms 23 and 24), situated directly behind the Throne Room, have been plausibly identified as oil magazines, since they contained 33 Minoan Linear B tablets, dealing with olive oil (indicated both by the appropriate ideogram and the occurrence of the word transliterated and interpreted by Ventris as ELAWON). Although the location of this storeroom for liquids, and the adjacent pantry with 600 shallow bowls, cups and dippers, might first have suggested a wine store, the presence in it of these olive oil tablets—even if fallen from an upper storey—seems too remarkable to be coincidental. The floor of this room was paved with stucco, and a stand 80 cm broad was built around the jars to hold them in place: there were 17 jars in Room 23 and 16 in the adjoining Room 24. The diameter was variable, in some cases up to 80 cm.

Adjoining these rooms was a third, Room 27, containing 16 pithoi. The North Magazine has again been identified as an oil store, but there is no clear supporting evidence.

Room 38, on the east side of the palace, contained jars so heavily burnt that Blegen considered they had contained oil which had added to the conflagration. Some jars of oil may have stood along one wall—possibly their contents being regularly used in the adjoining bathroom, Room 43, in which two jars, set in stucco, were also found. But some jars had fallen from above, so that it is possible that there was an entirely separate oil store above.

The good fortune of finding traces of oil at Mycenae (Mylonas 1967, 151), and tablets referring to oil at Pylos makes the positive identification of these oil stores very persuasive. Unfortunately, neither of these aids is available for wine, which leaves no trace in the material record and is less often dealt with in the tablets.

The important store-room at the north-east end of the palace at Pylos (fig. 15.10) has, however, been plausibly identified as a wine magazine, chiefly on the basis of four of the clay sealings found within it which bear Ideogram 131, identified by Sundwall, and later by Ventris, as indicating wine. Were it not for this specific identification, one might be tempted to regard this building, like the 'cisterns' of Mallia, likewise set apart a little

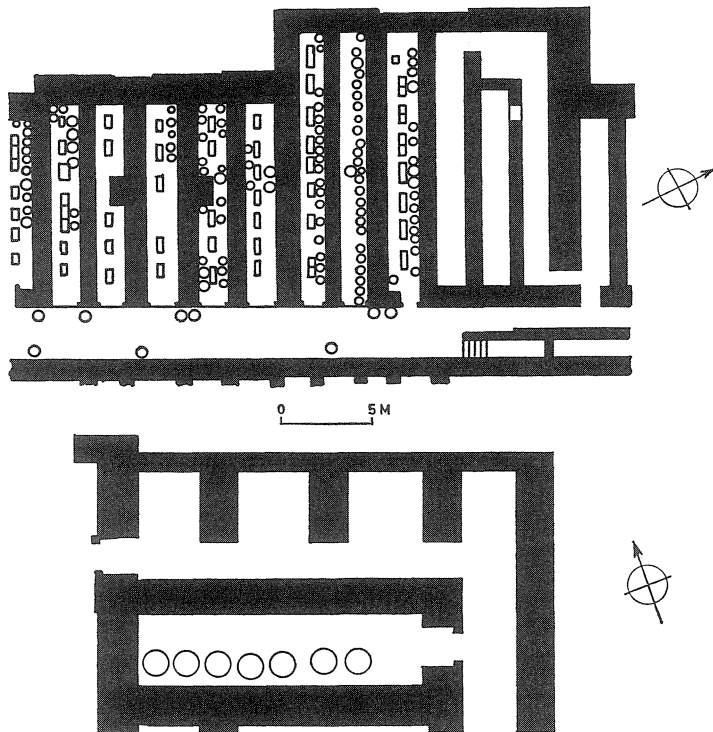


FIG. 15.11 The storage of food at Knossos. (Above) section of the West Magazines; (below) the Royal Magazines. Circles indicate storage pithoi (after Evans).

from the main building, as the palace granary. It may, like the magazines of Quartier XI at Mallia, have served a dual function. The building contained 35 pithoi altogether, from 55 to 80 cm in diameter, and up to 1.15 m high. Some were found to contain a deposit of black matter (Blegen and Rawson 1966, 345) which speaks against wine: perhaps some contained flour?

The largest of all the storage complexes yet discovered is the West Magazine at Knossos, which contained originally perhaps 420 pithoi, as well as numerous cists below ground level (fig. 15.11). Evans believed the pithoi to have contained oil, but both grain and wine are probabilities also (although it should not be forgotten that the Palace of Minos contained other magazines also).

Graham has estimated the total volume of these jars as over 60,000 litres; Ventris, using a greater volume per pithos, arrived at a figure of about 120,000 litres (Ventris and Chadwick 1956, 130). This capacity, although naturally considerably less than the modern production of oil for the *nome* of Herakleion (6,000 metric tons in 1962) compares with the annual production of oil for all Thessaly (131 tons in 1962).

REDISTRIBUTION

These storage facilities have been considered at some length because they underline the great importance of the subsistence subsystem in the palace economy. The complex accounting system of the Minoan Linear A and Linear B tablets gives some insight into the purpose of these stores—an insight which is dependent only in part on the Ventris decipherment, since the nature of the tablets as accounts, the system of computation, and the meaning of some of the ideograms had emerged clearly before the Linear B syllabary was transliterated. Among the ideograms most commonly appearing on the tablets may now be identified those for wheat, oil, barley, olives and figs, which occur in that order already on the Linear A tablets of Aghia Triadha (*ibid.*, 35). Indeed, wheat, oil, olives and figs are already seen in the hieroglyphic inscriptions of the Middle Minoan period (fig. 15.15). On the Knossos F series several foodstuffs occur in a constant order: barley, figs, flour, oil, wine, honey (Palmer 1963, 237).

The tablets fall, almost without exception, into three categories: records of receipts of goods, of disbursements of goods, and inventories (including tallies of livestock, land holdings and lists of personnel). The out-payments include rations for personnel and 'ritual offerings', some of considerable size. The in-payments include carefully calculated tribute assessments, together with a record of any deficit in the actual payment. Some of the tablets dealing with livestock have been plausibly interpreted as referring to the target level for the flocks, as well as assessing the expected yield to be sent to the palace (Killen 1964).

The tablets document what the large food reserves in the palaces would lead us to suspect: that the palaces were *major redistributive centres*. They thus made possible the exchange or transfer of goods which in classical times were interchanged in markets, where their value was recognised in terms of a given medium of exchange, at first possi-

bly cattle (which are often used in Homer to express value of goods) and later money. In neolithic times, transfer of goods between villages or between groups within a village is likely to have been within a framework of reciprocity: 'movement between correlative points of symmetrical grouping' (Polanyi, Arensburg and Pearson 1957, 250). The redistributive system presupposes some central authority, and the provision of this authority and the administration of the redistribution was the most significant function of the palace. As Karl Polanyi has written (1960, 342): 'The authentic core of the Mycenaean economy was the palace household with its storage rooms and its household accounts which listed personnel, land-ownings and small cattle, assessed deliveries in wheat or barley, oil, olives, figs and a number of other staples (largely unidentified) and handed out rations.'

The tablets, while they reveal 'a massive redistributive operation' (Finley 1957, 135), never document exchange, or the equivalent of different types of goods one with another. In consequence, no fixed rate of exchange, whether in cattle, wheat, metal or money was required (Ventriss and Chadwick 1956, 198). The composite tax, where a given community was assessed in terms of several different commodities due, was a submonetary device of considerable ingenuity, and the Minoan-Mycenaean economy 'may well be the only case on record in which a literate community eschewed the employment of money for accounting' (Polanyi 1960, 340).

The core commodities of the economy were the subsistence commodities: quite naturally the out-payments were in terms of foodstuffs (although smiths, of course, received metal as a necessary requisite for their work). And the growth of the palaces has to be seen in the first instance as the development of redistribution centres for subsistence commodities, controlled by a well-defined social hierarchy. The emergence of Aegean civilisation can be comprehended only if this central point is kept in view.

Population Subsistence and Growth: The Consequences of Diversification

In this chapter we have outlined the development of the subsistence subsystem, from a hunting economy which may have supported some 0.1 humans per sq km⁴ to a highly organised redistributive system supporting, in Crete or Messenia, perhaps 20 to 50 persons per sq km.

One of the least understood aspects of anthropology (or indeed of ecology) is the dynamics of population growth. Clearly it is linked with the subsistence potential available, but other factors appear to limit the population before it rises to the maximum which the land can support. And while the factors which govern the death rate are open to analysis, those which control the birth rate are less evident. Clearly a nomadic or semi-nomadic life pattern sets limits on the number of children a mother can bear or rear, and a neolithic sedentary population offers the possibility of rapid population growth.

4 Taking the figure for upper palaeolithic Khuzistan proposed by Hole and Flannery (1967, 165).

The problem of analysing population growth in prehistoric times is complicated, for instance, by the question of infanticide, which may have been significant in classical Greek times, and by a range of conception-avoiding practices including homosexuality, a 'dark corner, into which for the sake of our peace of mind we had better not pry too closely' (Michell 1957, 24). A whole series of further factors, such as the age of marriage, the existence of dowries, and the rigidity of moral prohibitions, intervenes.

Palaeopathology, and the age-structure analysis of cemetery populations can give a good indication of life expectancy (cf. Howells 1960, 171), and Angel (1966, 760) has studied the occurrence of skeletal deformations resulting from malaria in prehistoric Greece. He concluded that death from malaria may have been very high during the early neolithic period, but decreased considerably during later prehistoric times. It increased again, however, in Hellenistic and Roman times. These are again relevant factors, and they are more accessible to the archaeologist than those relating to birth.

No account is taken here of the supposed racial identifications arising from craniometric studies: the astonishing variety of racial types which some anthropologists can read into a small collection of skulls from a single early village cemetery verges upon the absurd. While we must seriously assess the cultural effects of possible influxes of new population, these 'racial' effects, if they are not trivial, have yet to be successfully investigated using samples of adequate size.

We must guard also against the assumption that population density is directly controlled by the available supply of food. Binford (1968b, 326) cites demographic and ethnographic studies for hunting-gathering populations suggesting that in any given habitat the population is homeostatically regulated (by predominantly cultural factors) below the level of depletion of the local food supplies. We can safely assume that this holds also for agricultural societies—although of course a drastic reduction in food production, through drought, or blight, or destruction of resources, can well produce famine and a population decrease through starvation.

But we can equally conceive that any significant innovation in food production, such as the domestication of new species, offers the possibility of a population increase. The innovation will affect the equilibrium of the system, and a population increase is one possible homeostatic response. And while social and cultural factors might intervene to prevent acceptance of the innovation, it seems useful to look for evidence of some such changes in the subsistence subsystem when a significant population increase is observed.

DIET

In the absence of firm demographic data which might help to explain the increase in population documented in chapter 14, the obvious approach is to seek to relate this to the increased food production (or increased potential for food production) arising from the new species cultivated, and the new organisation of the subsistence subsystem.

Just how significant the changes were is documented by a study of the diet of the ancient and modern populations in the southern Aegean. The considerable importance

of the olive, today as in Mycenaean times, and the very minor role of livestock, indicate that the consequence of the changes must have been considerable.

We have three approaches towards the reconstruction of the prehistoric diet. First are the material remains relating to subsistence, which have been discussed in the preceding sections. Secondly, the Minoan-Mycenaean tablets give details of ration allowances, which are also relevant. And thirdly, the diet of Greece in recent times can provide a basis for discussion, since the basic staples of the diet are exactly those already available in bronze age times. As a background to the discussion we may bear in mind that the daily food intake generally considered acceptable today is about 2,650 calories, plus 65 grams of protein, together with small but significant quantities of various vitamins, of calcium and of iron.

MODERN DIET

The modern diet in Crete is based on precisely the same staples whose importance in prehistoric Crete has already been documented (with the addition of potatoes and a few fruits). It greatly illuminates the prehistoric diet, and strongly suggests that meat was not then, any more than now, a very significant component of the food intake. The relative importance in the modern diet of the various food resources is shown in fig. 15.12. The two basic essentials of the diet are energy and protein.

In considering the *energy* intake a significant feature is the major contribution made by oils and fats (chiefly olive oil.) The figures are shown in Table 15.3.

TABLE 15.3 The contribution of various classes of foods to the energy intake of the population of Crete and Greece, compared with that of the United States of America (from Allbaugh 1953, 132).

<i>Food group</i>	<i>lbs per week</i>	<i>calories per day, %</i>		
	<i>Crete, 1948</i>	<i>Crete, 1948</i>	<i>Greece, 1948-49</i>	<i>USA, 1948-49</i>
Cereals	5.4	39	61	25
Oils and fats	1.3	29	15	15
Vegetables and fruits	8.3	11	5	6
Pulses and nuts	0.8	7	6	3
Potatoes	2.5	4	2	3
Meat, fish, eggs	1.2	4	3	19
Dairy produce	0.7	3	4	14
Sugar and honey	0.2	2	4	15
Wine, beer and spirits	0.4	1	0	0
Total calories/person/day		2,547	2,477	3,129

We see, that in Crete, as in Greece, cereals, oils and fats, vegetables and fruits together account for 80 per cent of the energy intake, as against 46 per cent in the USA. In Crete, oils, fats, vegetables and fruits (but without cereals) account for fully 40 per cent, in Greece as a whole for only 20 per cent. By contrast meat and livestock products constitute merely 7 per cent of the energy intake in Crete, as in Greece, comparing with 29 per

cent in the USA. And a significant picture is obtained when the *protein* intake of Crete, Greece and the USA is compared.

The essential point here is that vegetable protein accounts for 76 per cent of the total protein in Crete, and fully 81 per cent in Greece as a whole, as against 34 per cent in the USA. The significant role of the pulses and nuts should be noted. It has been well

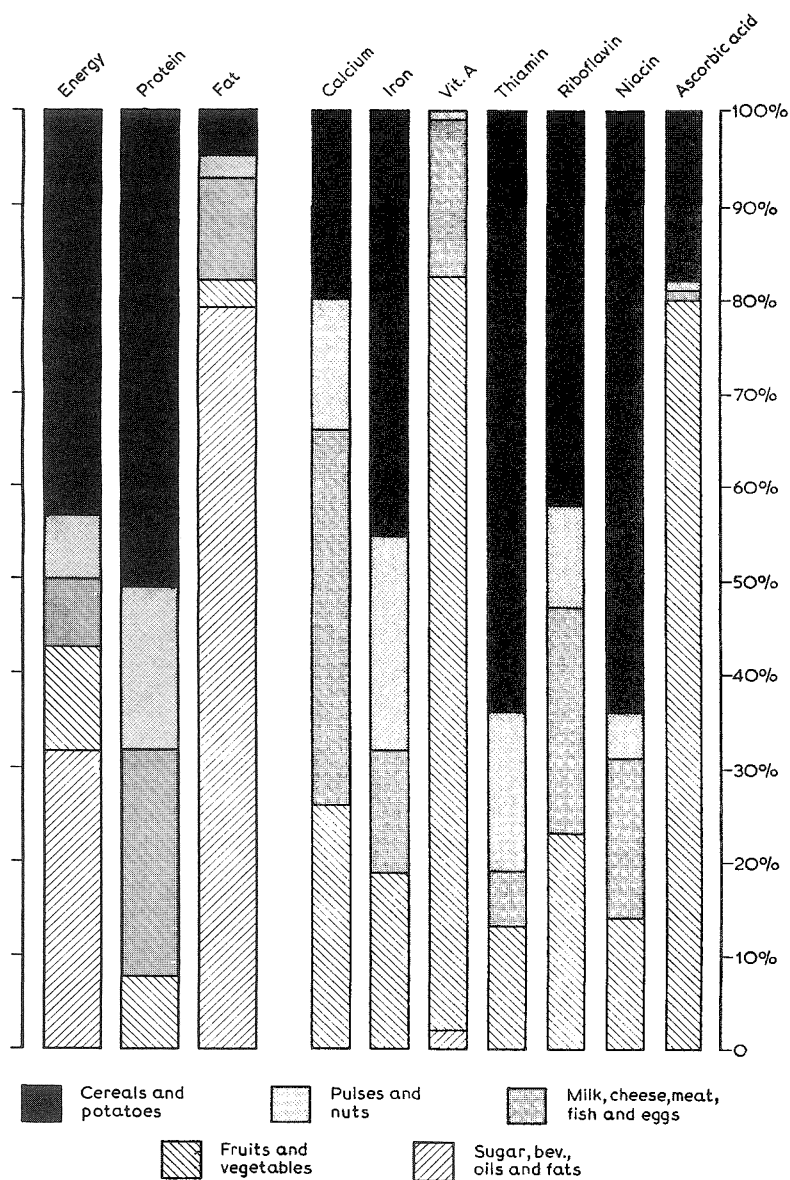


FIG. 15.12 Diet in Crete. Sources of nutrients in the diet of a sample of 128 families in 1948 (after Allbaugh). Note the significance of oil, and the small importance of animal protein.

said that 'pulses are the poor man's meat', and the observation here ties in well with the abundance of pulses in the prehistoric deposits of the Aegean from early neolithic times onwards (cf. Table 15.4).

The total annual intake per head of meat, fish and eggs is about 60 lbs in Crete; and a considerable part of this (about 20 lbs) is contributed by fish, so that the total meat intake is only 25 lbs per year. It is interesting that the average meat consumption by weight is only five times that of land snails. Anyone who has lived in rural Greece knows that meat is something of a speciality, and the keynote of the Easter celebrations is roasting

TABLE 15.4 The contribution of various classes of foods to the protein intake of the population of Crete and Greece, compared with that of the United States of America (from Allbaugh 1953, 133).

<i>Food group</i>	<i>protein intake %</i>		
	<i>Crete, 1948</i>	<i>Greece, 1948-49</i>	<i>USA, 1948-49</i>
Cereals	47	65	21
Meat, fish and eggs	19	11	40
Pulses and nuts	17	10	5
Vegetables and fruits	8	4	6
Dairy produce	5	8	26
Potatoes	4	2	2
Oils and fats	0	0	0
Sugar	0	0	0

lambs on Easter Sunday. Indeed, one of the outstanding differences between the diets of the Mediterranean peoples and of Americans is the small amount of animal protein consumed by Mediterraneans (Allbaugh 1953, 32).

Most farms in Crete do not have significant flocks of sheep or goats: 80 per cent of farms have only four or fewer sheep, and 85 per cent have only one or two goats (*ibid.*, 551). Most of the meat consumed is goat and kid, with lamb and mutton next in importance. Beef and pork are eaten only in small amounts. The proportion by species of modern livestock are very like those of prehistoric times in southern Greece.

By contrast 76 per cent of farmers raise wheat, 63 per cent raise barley, 68 per cent grow pulses, 97 per cent cultivate olive trees and 85 per cent cultivate vines for wine grapes. The modern figures thus confirm the impression given by the prehistoric food figures, and indeed it seems a valid generalisation that, of all the countries of Europe, the Mediterranean vine-growing countries show the least emphasis on livestock, despite the considerable numbers of sheep and goat which are kept (Stamp 1965, 35).

Olives produce the highest yield of calories per acre of all the relevant crops (1,710,000 calories per acre) as against 986,000 for barley, 767,000 for wheat and 950,000 for pulses. Indeed for the period 1930 to 1938 olives represented about 40 per cent of the total value of the agricultural produce of Crete. The importance to Cretan agriculture in the bronze age of the inception of systematic olive cultivation must have been considerable.

On the other hand, pulses have the highest protein yield (76 kilos of protein per acre) compared with 33 for barley, 28 for wheat, and 0 for olives. The keynote of agriculture in southern Greece, as exemplified by Crete, is indeed its diversity. The land use proportions in Crete in 1948 illustrate this point (fig. 15.13).

A typical Cretan farm of 9.2 acres, will have about 2.3 acres of grazing land, 2.0 acres where cereals are grown (equally divided among wheat, barley and oats or maslin), 0.5 acres in vetches or pulses, 2.5 acres with about 140 olive trees, and 0.8 acres with about 1,300 grape vines. The remaining 0.8 acres will be in vegetables, and hay or fal-

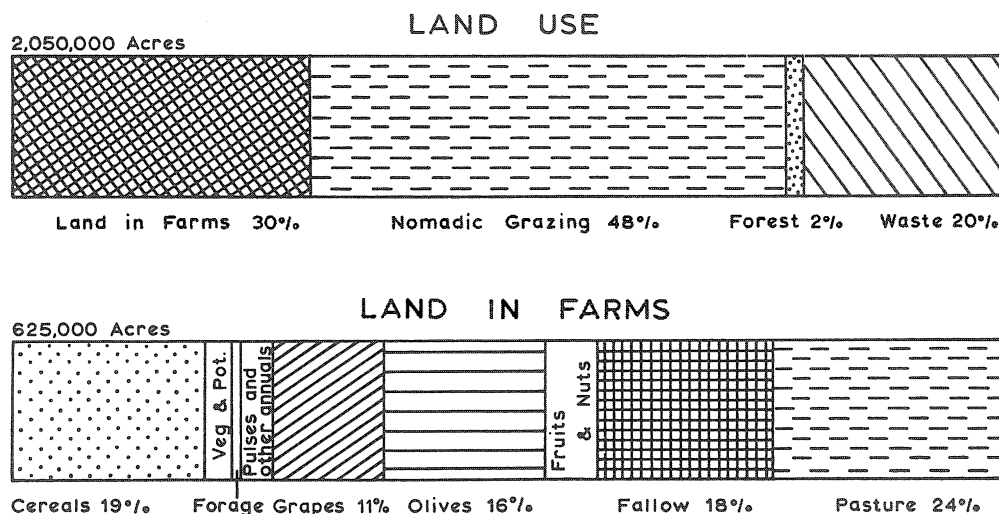


FIG. 15.13 Modern land use in Crete (*after Allbaugh*). Note the limited area under cereal cultivation, and the importance of tree crops. The picture may have been similar in bronze age times.

low. This, then, is precisely what is meant by the term Mediterranean polyculture. A similar picture may be obtained for most of southern Greece, where the olive and vine are intensively grown. As already indicated, the distribution of this subsistence pattern corresponds precisely to the extent of the Minoan-Mycenaean civilisation.

The modern figures for diet in south Greece thus indicate a subsistence basis very similar to that which we have deduced for bronze age Greece from the prehistoric finds of preserved foodstuffs. Although the record is an imperfect one, the Linear B tablets do indeed reinforce this impression of dietary continuity.

DIET IN THE TABLETS

The tablets give details of ration allowances, and the system of units in which they are expressed is clearly understood. But unfortunately the absolute values of the units of capacity are a matter for guesswork. Ventriss and Chadwick (1956, 59) use what appear

broadly reasonable figures for the rations in order to arrive at absolute values for the units themselves. Any effort to use the same data to yield a quantitative figure for the rations thus risks circularity.

Palmer (1963, 13) takes a classical Attic measure of capacity as the basis. In Greek times a *choenix* of wheat (0.9 litres) was the daily ration for a man, and the assumption that the basic daily ration of wheat in Mycenaean times was the same leads to plausible conclusions. At Pylos, men, women and children received rations in the ratio 5 : 2 : 1 (*ibid.*, 96). It seems that when barley was issued instead of wheat, double the volume was given, a ratio not fully explained by its 'smaller nutritional value'. Figs are often issued in equal quantity to wheat, and olives occur in smaller proportions. Wine and wheat, or wine and figs were issued in the ratio 6 : 8 (*ibid.*, 227; 232; 14). But while these ratios are securely documented, the absolute values are not. Nor is the periodicity of the payments clear, although the grain rations are reckoned on a daily basis.

The Mesopotamian ration tablets offer useful analogies: there barley rations, calculated on a daily basis, were issued once a month, wool rations once a year and oil once or sometimes twelve times per year (Gelb 1965, 234–35). Workers received 60 quarts of grain and one-fifth quart oil per month, and four pounds of wool per year. When barley was replaced by oil, one quart of oil was issued instead of two of barley. 'Still more commodities are distributed in a haphazard way, sometimes at festivals or other special occasions, sometimes as replacements for commodities regularly rationed. Among these are: meat of sheep and cattle, milk, cheese, butter and other dairy products, onions, legumes, cucumbers and other vegetables, dates, figs, apples and other fruit, condiments and beer and wine' (*ibid.*, 237).

A key point arising from the Mesopotamian and Linear B tablets, and predictable already from a consideration of the modern diet, is that meat was not regularly issued to these 'semi-free' workers. Of course the tablets indicate the existence of large flocks, but these were kept principally for wool; oxen were kept, often in pairs (the animals were given names, recorded on the tablets) for ploughing. This is in keeping with modern practice in southern Greece, where cattle are not raised specifically for beef or milk production (FAO 1947, 107). The totals recorded at Pylos—'only a small percentage of the total flocks' (Ventrìs and Chadwick 1956, 198)—are: sheep 10,157; goats 1,825; pigs 540; oxen 8; stags 16. Palmer (1963, 19) suggests that the total stock at Pylos may have been in excess of 100,000, while for Knossos Killen (1964, 5) suggests the total of sheep recorded cannot fall short of 80,000. One series of tablets at Knossos lists a total of 25,000 sheep (Ventrìs and Chadwick 1956, 209).

As discussed in chapter 14, these stock figures may suggest a human population of the order of 50,000 persons in the lands controlled by the palace of Knossos. This is clearly much greater than Godart's figure (1968, 63) of 4,300 individuals receiving rations at Knossos. We must assume that only those persons living in the palace itself received rations—perhaps some 10 per cent of the total population of the region under palace control.

Of particular interest are some tablets which record mixed livestock, perhaps the inventory of a farm. One such tablet documents 202 rams, 750 ewes, 125 he-goats, 240 she-goats, 21 boars, 60 sows, 2 bulls and 10 cows (Ventris and Chadwick 1956, 213). Or again 60 rams, 270 ewes, 49 he-goats, 130 she-goats, 17 boars, 41 sows, 2 bulls and 4 cows (Palmer 1963, 184). It is clear, therefore, that even in these mixed herds, which were not specialised wool herds, the proportions might be of the order of 60 per cent sheep, 25–30 per cent goats, 5–10 per cent pigs, and 1 per cent cattle, with a female: male ratio of between 2:1 and 4:1 for the various species. These figures compare well with the proportions for livestock species obtained from the study of the prehistoric animal bones, as discussed in previous sections.

The Linear B tablets thus harmonise well both with the actual finds of foodstuffs from prehistoric contexts, and with the modern dietary statistics. Livestock played a minor role as a food source, although sheep were kept for wool. Cereals were the staple food source, but they were frequently supplemented by olives, olive oil and figs. Wine was sometimes issued.

As the modern figures bring out, the significant feature here for Aegean prehistory is the considerable role of non-cereal crops—olive, vine and fig. Their systematic exploitation, which is seen in the early bronze age, added an entirely new dimension to the diet.

THE GROWTH OF THE SUBSISTENCE SUBSYSTEM

Nothing could be more misleading than to attribute the emergence of Aegean civilisation simply to subsistence changes. From the beginning of the neolithic period, around 6000 BC, all the plants and animals which had a significant role in late bronze age times were already present. The innovations in the developing agriculture were thus largely cultural, with human control of these species the deciding factor. Nor was subsistence the most significant feature, although certainly an important one. The story is one of the development of a society which was based on more than simply a 'subsistence economy'. The subsistence subsystem developed, along with other social and technical elements: it did not lead the way.

The early neolithic economy was based primarily upon cereals. Probably, as today, pulses and meat products contributed in about equal proportions to the protein intake, but here again cereals may have had the determining role. We see in early neolithic times a very restricted economy centering upon emmer wheat, pulses and sheep/goat. During the later neolithic a considerable diversity develops, with a deliberate collection of exploitation of a whole range of wild species, including the fig and the grape.

As a result of some specialisation among these various species the vine and the olive were domesticated. The domestication of the olive was a crucial step, for it radically altered the land use pattern. Olives and vines can be cultivated in areas where cereals and pulses will not grow, and also in cornfields. Their introduction thus resulted in a significant overall increase in production, without competing too seriously either with

the plants or the animals already reared. The potential increase in output (in terms of calories) may have been as much as 40 per cent in Crete and Messenia—since the trees do not require attention at the same time as the cereal crops. Neither in land nor in labour requirement is there a serious conflict between the cereals and the tree crops.

In Crete and Messenia (growth pattern A), where there is abundant land for cereal cultivation, the change was doubtless important enough. In areas of much more limited agricultural potential (growth pattern B) the transformation may have been radical, perhaps making viable for the first time the yield from extensive marginal lands. It is in this way that the dramatic rise in population in the Cyclades, for instance, may have been supported. In a given small region there were now 3 or 4 productive micro-environments instead of the two principal neolithic ones—flat arable lands, and hill slopes for the grazing of stock. Indeed the population leap throughout southern Greece at this time may partly be attributed to the introduction of viticulture and the olive.

Modern land use maps anywhere in south Greece show how the cultivation of the olive and the vine brings into use large areas of land not suited to cereal agriculture. Each local region now has a range of several useful micro-environments: farming activity is increased and diversified.

The map, fig. 15.14, actually taken for the hilly region of Selinon in modern south-west Crete, is fairly typical of the various areas whose population growth in prehistoric times corresponded to pattern B. 'Tree crops, by far the most important of which is the olive, are prominent in most of the valleys, and often extend a considerable way up the slopes. The flat floors of the valleys, where water is more easily obtained, often have small fruit and vegetable plots and vineyards, particularly near the villages. The areas devoted to the production of grain and fodder include not only the valleys and their slopes, often terraced, but also flat land in a relatively elevated position. The map emphasises the large area of scrub and bare rock, comprising the higher valley slopes, the more elevated ridges and the mountains. This land provides little more than rough grazing' (Smith 1966, 10).

Specialisation during the bronze age in these two new species, the olive and vine, had also a significance which went far beyond an increase in overall farming yield. Indeed grapes and wine do not have a particularly high calorific content, and do not contribute significantly to the diet in modern Greece. But wine is much drunk. Here the preference is a cultural and not a nutritional one.

A major feature which must be emphasised is the *diversity* which these crops brought to the subsistence system—a diversity dependent in south Greece not upon any major underlying regional division (although of course olive trees will not grow above 600 m, and summer pasture lands are often found above that altitude) but simply on the variations in terrain in most regions, where the flatter lowlands make good arable land and the valley and hill slopes were easily adapted to viticulture and olive cultivation. Different farms would now have had a local surplus of various commodities, which could be exchanged locally. The diversity thus tended to promote in the first instance marketing and redistribution within local regions rather than long range commerce.

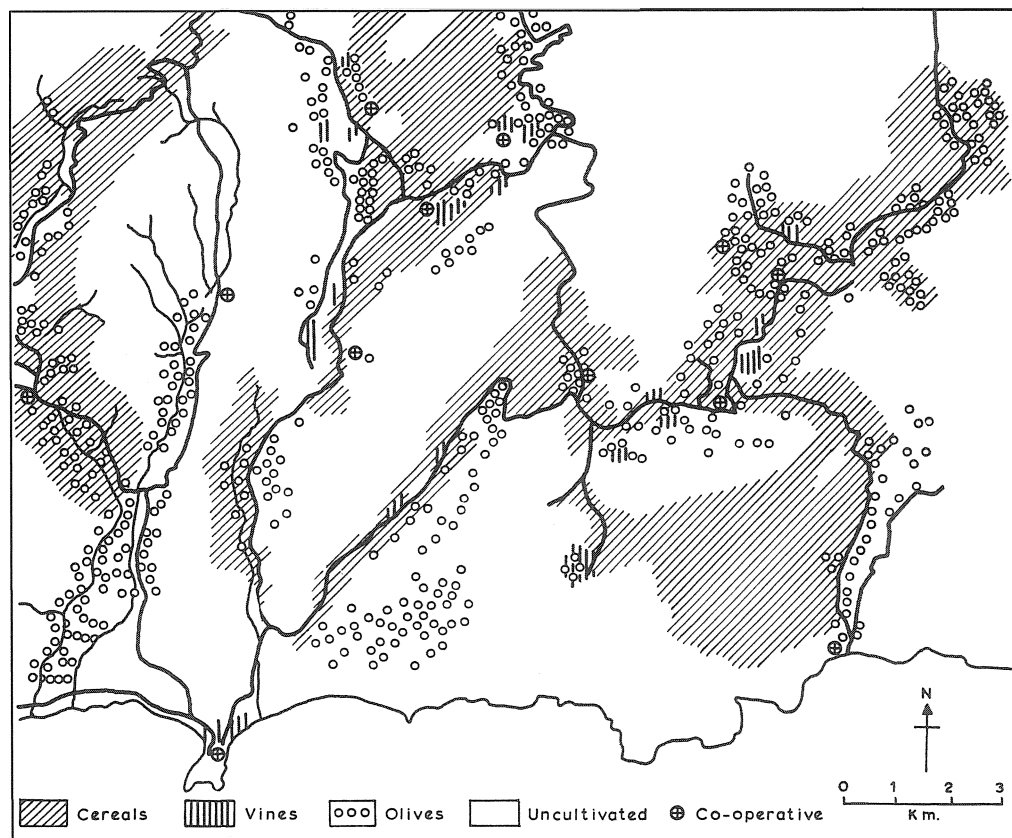


FIG. 15.14 Diversity in agricultural production in modern Crete. The three major crops are not altogether in competition for land. The inception of olive and vine cultivation in the third millennium significantly increased potential output. Note that the modern co-operatives fulfil some of the functions of the Minoan redistributive centres. (Paleochora district, Selinon region, southwest Crete: after Smith, D. M., et al. 1966.)

So long as cereals were the chief agricultural product, total self-sufficiency was almost imperative. Under-production of grain could not be set off against a surplus of another commodity, and famine would result. A diversity of crops gives much more flexibility, and produces a measure of economic inter-dependence. This may be based upon reciprocity, but already the House of the Tiles at Lerna, with its sealings upon jars, hints that a redistributive system was emerging in the third millennium. Some specialisation is a natural consequence of such diversity.

The efficient production and dissemination of these products promoted a demand for them (clearly the demand for wine spread rapidly) and production increased. The need for organisation is paramount here—and is well exemplified by the recent growth of 'co-operatives' in Crete (fig. 15.14; cf. Allbaugh 1953, 252). In 1948 there were co-operatives for six different commodities: raisins, olive oil, wine, cheese, honey and fish,

and 70 per cent of farmers in Crete were members. Omitting fish (which depends upon refrigeration) and adding wool, we have a remarkable parallel with the Cretan palaces. The co-operatives, like the palaces, can take delivery, store in warehouses, transport and distribute agricultural supplies, market and (grant credit in order to) provide seeds, fertilisers, agricultural implements and supplies (cf. Smith 1966, 17). The oil co-operatives organise olive presses, although this is done on a larger scale privately. The palaces obviously discharged all these functions, which are the direct result of the intensification of the production of the various commodities. The co-operatives today are the result of a need felt already in Minoan times, although they take a form appropriate to a money economy, and with the participation of free citizens. They show, none the less, just as do the collectives in other lands, some of the features of a redistributive agricultural system.

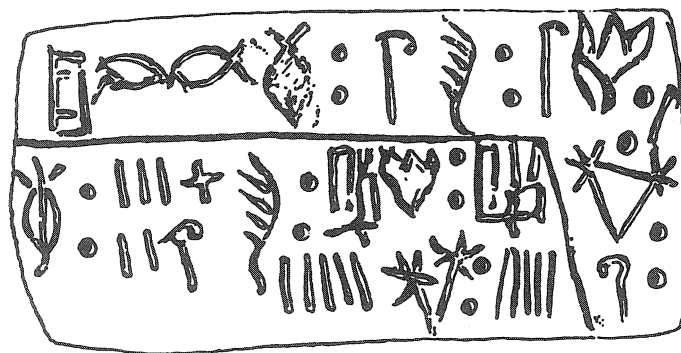


FIG. 15.15 Clay tablet from Middle Minoan Phaistos with a hieroglyphic inscription recording a transaction in subsistence commodities. The ideograms for wheat, oil, olives and figs are seen in the top line (after Evans). Length 8.5 cm.

Undoubtedly the development of writing in Crete was stimulated by the bulk and complexity of the redistributive transactions in the palaces. Fig. 15.15 shows a hieroglyphic tablet from Phaistos, of middle bronze age date, with the hieroglyphs for wheat, oil, olive and figs. It serves as a reminder that the subsistence system interpenetrates those for organisation, for trade, and indeed the projective systems also.

The exploitation of the new species olive and vine thus had significant effects on the potential population which the land could support, and on the subsistence subsystem. By allowing the exploitation of effectively new micro-environments within each region, it increased the total potential output of farming produce, and hence the total potential population. And by increasing the range of crops produced, it introduced a new diversity to the subsistence economy. This in time offered the opportunity for a redistributive system controlled by a central organisation.

This organisation and some of the other effects of the new products and new occupations are discussed in succeeding chapters.

Chapter 16

The Development of Aegean Metallurgy

The invention of metallurgy was one of those decisive steps which led directly towards the emergence of civilisation in the Aegean. It was certainly not the only such step, for a whole wide range of occupations and crafts grew up during the third millennium, of which metallurgy was only one, although probably the most important. For the first time agriculture became simply one of a number of occupations or preoccupations within society, rather than the prime and principal concern of most of society's members.

The metallurgical revolution, like most revolutions, took a very long time—at least 2,000 years from the first metal objects to the supreme accomplishments in the Shaft Graves of Mycenae. In this it resembles the 'neolithic revolution' which likewise can be seen to have gone through an accelerated cycle of diversification, specialisation and intensification. Why it happened and, conversely, why it took so long to happen, are questions that have to be answered within a social context.

Once again the practice of metallurgy can be regarded as constituting a subsystem within the society, and later within the civilisation. It was dependent for its growth upon other factors: some of the techniques were available for a millennium before they were intensively used. And it dramatically influenced other systems such as warfare and trade. Above all, perhaps, it created a new kind of wealth. It is in the positive feedback between these systems and metallurgy that the speed of its development during the later third millennium BC can be understood.

In this chapter the development of Aegean metallurgy is surveyed. The basic techniques involved are first considered, and the repertoire of new forms is then reviewed. They made possible a wide range of new occupations, both peaceful and warlike.

Pyrotechnology and the Origins of Metallurgy

Pyrotechnology, man's control of fire and his use of it to produce new materials, began in the palaeolithic period. Cooking, which naturally involves the physical and chemical

transformation of material, was presumably an early use. Since cooking, boiling as well as roasting, can conveniently be carried out in skins, the advance leaves little trace upon the archaeological record. The use of 'pot-boilers' was an early exploitation of the high specific heat of stone. The fire hardening of wood is documented in palaeolithic times and clay figurines were baked at Pavlov and Dolní Věstonice in the Gravettian culture of Czechoslovakia more than 20,000 years ago.

The careful control of temperature, setting a maximum as well as a minimum to the desired temperature range, marked a new advance. It is documented in the simple ovens which occur so widely among the early neolithic communities of the Old World. These were probably used in the first place not primarily for baking bread but for parching grain. Parching is needed to allow the separation of the grain from the glumes (husks) during threshing or pounding, a problem encountered with all the hulled wheats (Harlan 1967). Moreover, in wet climates, when the existence of the community through the remainder of the year depended upon grain storage, the drying of the grain by raising it to about 180° C to prevent germination was an important step. Remains of ovens for these purposes have been found at pre-pottery neolithic sites in the Near East, such as Jarmo and Tepe Guran.

Ovens of similar design are widely found in Greece during the neolithic period and are seen already at Nea Nikomedeia. Good examples were found at Sitagroi and neolithic bread ovens were reported by Tsountas at Dhimini and Sesklo (Tsountas 1908, 104). At Sitagroi a raised platform of horseshoe shape, about 70 cm long, formed of successive layers of pebbles and baked clay, was surmounted by a baked clay dome, open at the front. Such ovens were found in Middle Helladic levels at Eutresis and the excavator effectively illustrated their use with a Greek terracotta model showing their mode of operation in classical times (Goldman 1931, 42 and fig. 52). Such ovens are still in use in Greece today (FAO 1947, 77, fig. 32), and were clearly used throughout Greece in prehistoric times, although possibly not in Crete (Hutchinson 1962, 245). They were heated by lighting a fire within the oven itself. When the temperature of the chamber had been raised to the desired level, the embers of fuel were removed and the grain for parching, or the bread for baking, was inserted.

This documents the sort of controlled firing relevant to the baking of pottery (although at a much lower temperature). Pottery can, of course, be very effectively fired in an open fire, with branches and other materials heaped above to control the atmosphere and reduce cooling (Singer, Holmyard and Hall 1954, I, 391), but the development of the potter's craft in later neolithic times necessitated better control than this. Frierman (in Renfrew 1969b, 42) has shown that some Balkan pottery, which is identical to that seen in the final neolithic of east Macedonia, was fired to a temperature greater than 1,000° C, and in a reducing atmosphere. This surely implies some sort of kiln.

Fortunately, just such a kiln was excavated at Olynthos (fig. 16.1; Mylonas 1929, 12). It was of vertical type, with a fire chamber beneath, and a larger space above for the pots. At Sitagroi an oven or kiln of unusual form was found in the Burnt House of phase Va.

A hole in the side was presumably for controlling the draught. The superstructure was not well preserved, however, and the details of its functioning are not clear.

Ovens or kilns with facilities for controlling the draught are rarely found in prehistoric deposits, although potter's kilns are reported from Berbati, Mycenae and Tiryns, all of the late bronze age (Persson 1942, 151; Wace 1949, 135). A smith's hearth or oven was found in the Second Palace at Phaistos, likewise dating from the Late Minoan period (Pernier and Banti 1951, 215).

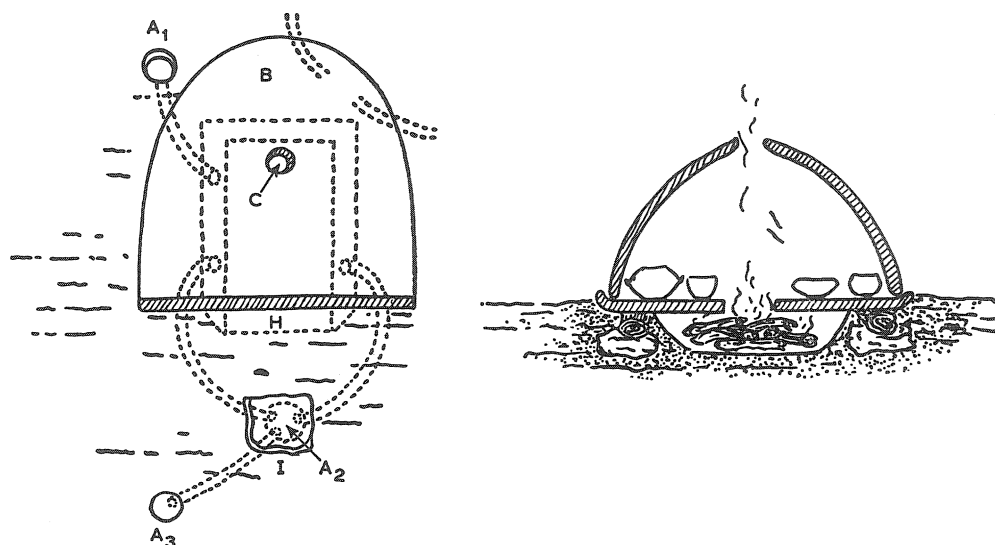


FIG. 16.1 Plan and reconstructed section of the late neolithic kiln at Olynthos (after Mylonas).

All this is directly relevant to the development of metallurgy, since the conditions required for the production of Gumelnitsa-type pottery in the neolithic of north Greece and the Balkans are precisely those required for the smelting and casting of copper—a temperature of $1,100^{\circ}\text{C}$ and a reducing atmosphere (cf. Renfrew 1969b, 38). Such a temperature was doubtless reached in the Olynthos kiln.

This is no empty assumption, for one of the repeated lessons of recent years in Old World prehistory has been that copper is frequently found in early neolithic contexts. It occurs at aceramic neolithic Ali Kosh, Çayönü and Çatal Hüyük, and at the last of these, analyses have suggested that it was smelted from the ore rather than simply hammered into shape from a nugget of the native metal (Neuninger, Pittioni and Siegl 1964).

The excavations at Sitagroi in north Greece have convincingly demonstrated that copper was in regular use in the final neolithic of the Aegean. Copper beads are seen from the end of phase II, c. 3800 BC in radiocarbon years. During phase III pins and

awls are found together with smelting slags, which leave no doubt that copper was being smelted from its ores on the site itself. A gold bead of this period was also found. Tin bronze, however, is not seen until the early bronze age of phase V at the site. The finds, although small in themselves, are sufficiently numerous to document the continuity in metallurgy from the beginning of the fourth millennium BC onwards: there can be no doubt that copper metallurgy was regularly practised in north Greece during the final neolithic period.

Several other finds of copper have been made in neolithic contexts within the Aegean. Two splendid axes of copper were found in late or final neolithic levels at Sesklo (fig. 16.2; Tsountas 1908, 352): analyses confirm that they were not alloyed, while the presence of traces of other elements, including 0.17 per cent tin, suggests that the copper was smelted from the ore rather than being simply the native metal. The thickness, giving an almost square cross-section, is commonly seen on the rather similar Balkan axes of the same period, and Mr Bill Phelps informs me that similar plump tools have been found in what may be presumed to be a neolithic context in the Alepotrypa Cave in south Greece.

A further copper axe, this time shorter and flatter, was found in neolithic levels at Knossos (fig. 16.2; Evans 1921–35, II, 14 and fig. 3, 5), while copper ore, possibly used as pigment, has been found in early neolithic levels there (Evans 1964a, 146). At the final neolithic site of Kephala on Kea, copper smelting slags have been found and identified by chemical analysis. And the lower levels at Emborio on Chios already contained simple copper artefacts, including needles, a fish hook, an awl, a pendant of copper resembling in shape a gold one from Sesklo, and what may be a dagger fragment (Hood 1965).

The gold pendant from Sesklo was doubtless produced by hammering a small nugget of gold (Tsountas 1908, 350, fig. 291). It seems to confirm what the Sitagroi bead documents, that gold was used as well as copper in the Aegean, several centuries before the bronze age began.

In discussing the origins of metallurgy in the Aegean it has now to be conceded that the basic techniques were long known, perhaps for more than a millennium, before the great expansion during the Early Bronze 2 period. The forms were restricted almost exclusively to flat axes, awls, pins, fish hooks and beads, but the continuity in the Sitagroi finds establishes that they were not merely occasional products, nor were they imported. The old theory of an origin of metallurgy at the beginning of the early bronze age, and derived from Anatolia, can no longer be accepted.

We may well consider whether or not the techniques of smelting and casting copper, already understood in neolithic times, were introduced to the Aegean, and if so from where. If they were indeed introduced, one possible source area is the Balkan region, Bulgaria and Romania, where copper metallurgy has a high antiquity, and where all the forms seen in the neolithic Aegean, as well as shaft-hole tools, are found. Another possible candidate is Anatolia, where the Emborio, Beycesultan and Can Hasan finds

are relevant. On the other hand, a local origin should not be ruled out. We see that many early neolithic sites in the Near East already practised simple copper metallurgy: the same may yet prove to be true for Nea Nikomedeia. The Knossos ore finds perhaps point in the same direction. In this case the casting of axes could be a rather straightforward local development. The evidence of the ovens and kilns already cited documents that the appropriate pyrotechnic means were available.

At the outset of the early bronze age, then, we see that smiths had for many generations been casting and smelting. During the Early Bronze 1 period there is a limited interest in metals in the Aegean in general, although both Thermi and Poliochni have important finds. No metal objects whatever are known from sites of the Eutresis cul-

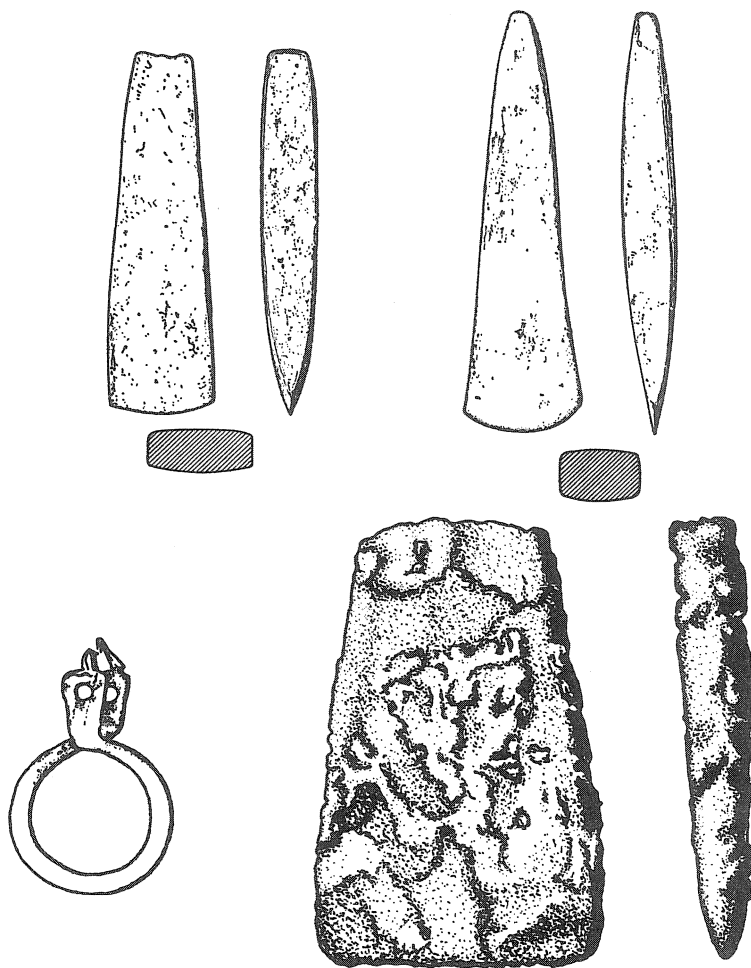


FIG. 16.2 Late neolithic metallurgy in the Aegean: two large copper axes (length 17 cm) and a gold pendant (length 3 cm) from Sesklo, and a copper axe (length 6 cm) from Knossos (after Tsountas and Evans).

ture, and a piece of wire together with some copper awls from the Louros grave are the only copper finds from the Grotta-Pelos culture of the Cyclades (Tsountas 1898, 156; Papathanasopoulos 1961–62, pl. 68). The finds from the First City at Troy include a ring, pins and needles, and two knives of copper together with a ring of tin-bronze and a few trinkets of gold (Dörpfeld 1902, 324; Blegen et al., 1950, 42). A dagger of the Blue phase was found at Poliochni (Brea 1964, pl. LXXXVI, a), together with the indications of metal working discussed below. A dagger and other objects of metal were unearthed also in Town II at Thermi (Lamb 1936a, 170).

Tin-bronze first makes its appearance at Sitagroi in phase V; it is already represented in the First Town at Thermi by a pin containing 13.10 per cent tin (*ibid.*, 215). Here, then, is a significant development, attested on three sites. The practice of alloying, which becomes widespread in the Early Bronze 2 period, had clearly already begun in the Early Bronze 1 phase.

The technique of alloying copper with tin to make tin-bronze is likely to emerge naturally wherever tin ores and copper ores are found in the same area. To the early smith all ores must have seemed like odd, heavy and colourful stones, and there was doubtless considerable experiment. The improved hardness resulting from the admixture of tin would soon have been noticed. Unfortunately no tin sources have been authenticated in the Aegean, although several possibilities have been discussed (Renfrew 1967a, 12). The consistently high tin content of many of the third millennium bronzes in the east Aegean (Bittel 1959, 1 f.), however, and the find of a bangle at Thermi (Lamb 1936a, 215) which was probably of pure tin—although antimony cannot be ruled out—are suggestive. It seems possible that there were in this region limited alluvial deposits of tin which were so far worked out in early times as to be no longer of commercial interest today. That some of the analyses of bronze objects of Troy VI–VII are rather poor in tin (Schmidt 1902, 337) indicates the possibility that this alluvial tin was becoming scarce in later prehistoric times, just as in the later phases at Ur.

Metallurgical Skills of the Aegean Early Bronze 2 Period

By the Early Bronze 2 period in the Aegean, metal objects had become exceedingly common. The range of forms will be discussed in the next section, and it is the technological aspects which interest us here. In the first place it seems likely that metallurgy was practised in all regions of the Aegean, although trade was also widespread. Probably no area was totally without copper resources (Branigan 1968, 50) and the copper ores from early neolithic Knossos were mentioned earlier. The site of Raphina on the Greek mainland has yielded important indications of metal working (Theochares 1952, 129). Several of the Cycladic islands have copper ores (Kordellas 1902; Davies 1935, 256): the blue powder in a little pot in the Goulandris collection (Doumas 1969, 39, no. 223) has been identified by Mr J. A. Charles as the copper ore azurite. Similar pots with azurite were found in the Louros grave (Papathanasopoulos 1961–62, 132). Copper

slag was found at Avyssos on Paros and at Chalandriani on Syros, and indications of metal working were found also at Phylakopi in Melos (Tsountas 1898, 176 and 1899, 124; Dawkins and Droop 1911, pl. vii; Atkinson et al. 1904, 190).

There is only one well-authenticated instance of the use of iron at this early time. A sceptre or pommel from Treasure L at Troy, perforated at one end, was found on analysis to contain 70 per cent iron (Schmidt 1902, 244, no. 6116). It may have been a lump of meteoric iron, such as was used in Egypt (Lucas 1962, 237) or even simply a dense and compact lump of ore, selected and prized as rare and valuable. There is no reason to suppose that it had been smelted. The Royal Graves at Alaca Hüyük, dating from about the same time, boasted a dagger blade of iron with a gold-sheathed hilt; this may itself be from meteoric iron. A cube of iron was found in a Middle Minoan II grave at Mavrospelio in Crete (Forsdyke 1926–67, 279) and this was followed in the late bronze age by a number of finds in Crete and mainland Greece (Coghlan 1956, 64), including several curious, composite ‘galvanic’ rings. Iron was exceedingly rare in the Aegean, and used primarily for trinkets until almost the end of prehistoric times (Desborough 1964, 70).

Alloying, generally with tin, became a very general practice in the Early Bronze 2 period. Many of the Troy finds are of good tin bronze, as are others from the Troad (Schmidt 1902, nos. 5831, 5855, 5823 etc.; Bittel 1959, 34). The majority of the finds at the Keros-Syros culture stronghold at Chalandriani in Syros were of tin bronze (Bossert 1967, 76). In Crete only 20 per cent of copper objects of the Early Minoan period were alloyed with tin (Branigan 1968a, 47), but the presence of this significant minority makes clear that shortage of tin rather than lack of metallurgical skill was the deciding factor.

A recent and exciting discovery is that many of the Aegean tools and especially weapons, notably those of the Cyclades, were of copper deliberately alloyed with arsenic (Renfrew 1967a, 14; Charles 1967; Branigan 1968a, 47). Of the eighteen metal objects of this date from Amorgos which have been analysed, 33 per cent show arsenic in greater concentration than 3 per cent. And of six early bronze age analyses from Naxos, five had significant quantities of arsenic (greater than 2 per cent) (Bossert 1967, 76; Stephanos 1905, 224). Arsenical bronzes are found in the Troad, although much less commonly than tin bronzes (Bittel, 1959, 34, nos. 4, 9, 10 and 13). And of the analysed examples in Early Minoan Crete, 37 per cent are of arsenical bronze. The whole metallurgical aspect of these data has been considered in detail by Charles who has convincingly shown the alloying to be a deliberate one, made in order to improve both the hardness and the forgeability of the material.

On the other hand it seems likely that tin was preferred wherever available, as at Syros and at Troy. In the later bronze age, even in the Cyclades, tin bronze was usual (Renfrew 1967a, nos. 40–42, 46, 70–72).

This vital innovation of alloying allowed the production of the whole range of weapons seen at this time. Most of them could be produced only by considerable forging after the initial casting, and for this, as well as for the improved hardness, the alloy was preferred (pl. 22).

A very vivid picture of contemporary metallurgical practice is afforded by the important finds at Chalandriani on Syros (Tsountas 1899, 124; Bossert 1967). They are to be dated to the later part of the Keros-Syros culture, in the Kastri group of the later third millennium BC. Tsountas found two moulds for the casting of flat axes and chisels in Room 20 (fig. 16.3), one of schist and the other of clay. In addition he found a

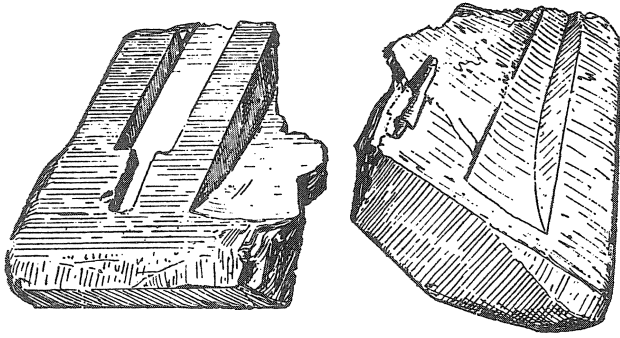


FIG. 16.3 Stone mould from early bronze age Kastri near Chalandriani in Syros, part of the equipment of a smith. Both faces of the stone have been carved for use as moulds. Length 15 cm (after Tsountas).

crucible containing traces of lead (Tsountas 1899, figs. 35–37; Bossert 1967, fig. 3.5), and in Room 11 a hearth, together with copper slag and another smelting crucible. There can be no doubt that copper was smelted in this room—apparently without a specialised kiln, although it is conceivable that a kiln, no longer preserved, may originally have existed.

An important hoard of objects was found in this same room together with the crucible (fig. 17.2). It contained two pins, two awls with quadrangular section, eight narrow chisels, and the blade of a saw. In addition there were six obsidian blades, the bone handle for one of the needles, and five of those curious stone rubbers which are a ubiquitous feature of the Early Bronze 2 period in the Aegean. A further such rubber was reputedly of metal. This assemblage was clearly the tool kit of specialist craftsmen, presumably a smith in view of the hearth, slag and crucible. Yet the finds clearly suggest he was also a specialist in carving of some kind—the saw obviously would not be used for metal working. Perhaps the kit was used for fine wood-carving; if pieces of marble had been found it would be tempting to suggest he was a sculptor as well as a smith, perhaps producing both stone bowls and figurines.

Although these are among the earliest moulds for the casting of copper or bronze which have been found, there can be no doubt that moulds were used during the final neolithic period, for axes at least. Perhaps the earliest mould yet found in the Aegean is one in clay from Thermi, used for the production of midrib daggers. There is a fragment of a stone mould from the Red period at Poliochni (Lamb 1936a, 159 and fig. 44; Brea 1964, pl. CLXXXVII, 13). Moulds have been found at Troy (Schmidt 1902, 265 f.), some of them with cavities on two or more sides like the Syros mould, to make the maximum

use of the stone, and there are moulds of very careful workmanship, often of steatite, for the production of small decorative objects. Other flat moulds of this kind are fairly common in later periods, being found at Gournia, Mallia and Palaikastro, for instance, as well as at Sesklo (Chapoutier and Demargne 1942, 63; Bosanquet and Dawkins 1923; Tsountas 1908, 334).

In the Early Bronze 2 period a significant advance is seen in the two-piece moulds, which allow the casting-to-shape of both surfaces of the object. One such comes from

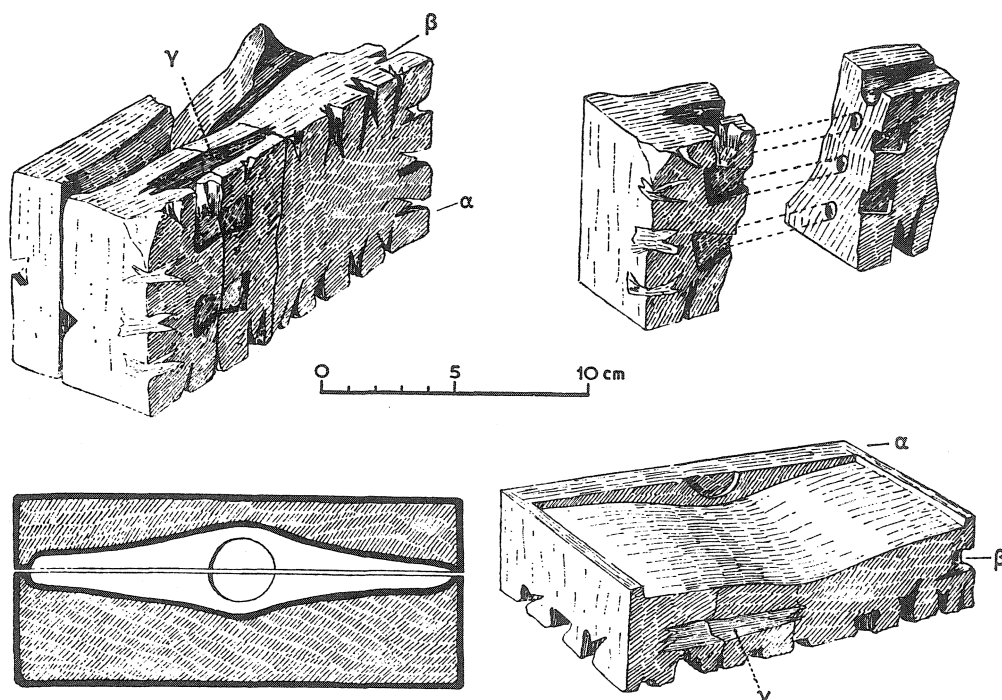


FIG. 16.4 Bivalve mould from a workshop at Middle Minoan Mallia, for the casting of double-axes (after Chapoutier and Demargne).

Early Minoan II Vasiliki, and there are examples from Troy also (Seager 1907, 116, fig. 2; Schmidt 1902, 266). Some of the metal shapes found at this period could have been produced only by such means. Two-piece moulds are of course common in later periods, especially for the manufacture of double axes. Examples, usually single halves, come from Phylakopi, Sesklo, Troy (Atkinson et al. 1904, 191, fig. 161; Tsountas 1908, 333, fig. 264; Schmidt 1902, 266, no. 6765) and other sites. At Mallia both pieces from a single two-piece mould have been found (fig. 16.4; Chapoutier and Demargne 1942, 60).

During the Early Bronze 2 period, casting by the *cire perdue* technique emerges also: it is clearly attested by an important find from the Blue period at Poliochni, contemporary with Troy I (Brea 1964, 67, 591 and pl. LXXXV, d). There, together with copper slag, a

clay mould for a shaft-hole axe was found. It was broken, and indeed had to be broken if the finished object were to be released. This competence in *cire perdue* casting is further documented by the little bronze figure from Treasure K at Troy, which is clearly cast in the round (Schmidt 1902, 242). It may be compared with a more sophisticated product from Horoztepe (Özgüç and Akok 1958, pl. x). Bronze animal figurines like the animal standards at Alaca Hüyük have not been found in the Aegean at this time, although there is a magnificent series of small bronze sculptures from later prehistoric times in Crete. The spouts and fittings for the metal vessels at Troy were also cast by this process (cf. Bittel 1959, 9 and 10).

The technique of 'casting-on' (i.e. burning together) may also have been employed. The technique of riveting was already understood. Rivet holes were sometimes punched through the material after casting, although in the case of daggers the holes were sometimes cast in (Branigan 1968a, 46): the slotted spearheads found in several areas were cast in that form (Schmidt 1902, 265, no. 6726). Silver was sometimes used for riveting daggers, and copper rivets were probably often used in bronze daggers as in the British early bronze age.

The wide range of metal vessels shows clearly that during this period considerable skills were developed in the working of sheet metal. The vessels were doubtless raised (or sunk) from flat castings, and it is interesting that moulds for broad flat discs have been found at the palace of Mallia (Chapoutier and Demargne 1942, pl. 15). Large receptacles of bronze have been found in houses at the same site (Demargne and Gallet de Santerre 1953, pl. xxix).

We see, therefore, that essentially the basic skills of bronze metallurgy evident in the Minoan-Mycenaean world emerge during the third millennium BC. Their evolution seems a natural one, given the firm underlying basis of neolithic metal technology.

The Metallurgy of Lead, Silver and Gold in the Third Millennium BC

The intimate relations between silver and lead metallurgy cannot sufficiently be stressed, since silver, unless found as the native metal, is obtained by the cupellation of lead ores (cf. Renfrew 1967a, 4 f.). When analysis of a object yields a significant proportion of gold, as in the diadem and dish from Dokathismata in Amorgos (Tsountas 1898, 187) it is probable that native silver was used. Partington (1935, 347) has stressed the great purity of silver found in Troy II as proof that cupellation was already practised. However, the analyses quoted by Schmidt (1902, 237) show a copper content of 3.41 per cent, gold of 0.17 per cent, iron of 0.38 per cent and lead of 0.22 per cent, so that the matter is far from clear. Lucas (1962, 248) indicated that cupellation was not known early in Egypt, and it is not yet certain whether it was practised during the third millennium in Anatolia or Mesopotamia. None the less it is possible that Partington was right, and that silver was extracted from lead ores at this time.

Lead can be smelted in an open fire, requiring a temperature of less than 800° C. It is the easiest of metals to work, since it melts at 327° C and is found already at Çatal Hüyük. Lead is found on very nearly as many sites in the Aegean as copper, and lead ores are extremely common, notably in the Cyclades.

Clearly lead was worked (and indeed probably smelted) at Chalandriani in Syros, as the crucible found there shows (Bossert 1967, 61), and in view of the silver objects also found the cupellation process may have been in use. Lead ingots were found at Phylakopi in Melos (pl. 18, 3; Atkinson et al. 1904, 92) and at Aghia Irini in Kea where they apparently served as weights. A large lump weighing 1,200 gm was found at Zygouries (Blegen 1928, 184). The most frequent use appears to have been in the riveting of broken pots (Renfrew 1967a, pl. 2, b) and this practice is reported at Aegina, Asea, Asine, Aghios Kosmas and Zygouries, as well as on Naxos (Holmberg 1944, 131; Frödin and Persson 1938, 257; Mylonas 1959, 138; Blegen 1928, 184). At Chalandriani in Syros a sheet of lead was applied to the pot to hold it together (Bossert 1967, pl. 42, d).

A second important use of lead was in the production of bracelets, which are frequently seen in the Cyclades, as well as at Thermi in Lesbos (Renfrew 1967a, nos. 3–6, 11; Lamb 1936a, 171 and 173), where a diadem was also found. There is a whole range of small leaden objects from Poliochni, and a few from Crete (Brea 1964, pl. CLXXVII; Branigan 1968b, 229).

An early bronze age lead figurine was found by Bent on Antiparos (Renfrew 1967a, pl. 1) and another was reported from Ios (Wolters 1898, 462; 1900, 339). A third was recently seen in private hands. (I am grateful to Mrs P. G. Preziosi for this information.) A lead figurine, which may be rather later in date, was found at Troy (Schliemann 1880, 337). From Early Minoan Crete comes a small lead bowl (Pendlebury et al. 1936, 108), and most remarkable of all are the three lead boat models from an early Cycladic grave in Naxos (pl. 28, 3 and 4; fig. 17.7; Renfrew 1967a, 5). These finds all serve to document the wide range of functions for which metal was used at this time.

Silver is found as widely. It occurs already in the Blue phase at Poliochni (Brea 1964, pl. LXXXVI, e), and at Thermi, in the later Grotta-Pelos culture of the Cyclades (Papathanasopoulos 1961–62, pl. 67) and possibly in Early Minoan I Crete (Branigan 1968b, 224). So far its earliest appearance in mainland Greece is in the Korakou culture. In general the silver objects found are of beaten silver: this is certainly true for all the silver vessels, and many of the pins (fig. 18.1). On the other hand the silver daggers found in Crete were evidently cast, and so was the pin from Amorgos and the silver dagger of Troy (Xanthoudides 1924, 47; Tsountas 1898, pl. 8, 66; Schmidt 1902, 248, no. 6149). Silver bracelets are also known in the form of torques of twisted silver (Renfrew 1967a, pl. 2, 3).

Gold too is widely found in the Aegean during the early bronze age. A piece of gold leaf was found at Thermi in Town I, and gold is seen in the First City of Troy (Lamb 1936a, 165; Dörpfeld 1902, 324). The single find of gold from the Cyclades is likewise from a context in the Early Bronze 1 period (Papathanasopoulos 1961–62, pl. 71). In the succeeding phase there are very rich finds of gold from western Anatolia, from Crete and from mainland Greece, but none whatever in the Cyclades.

Again the majority of gold objects are of beaten sheet gold (fig. 6.8), but just a few may be cast (Schmidt 1902, 345). What is so impressive at this time, however, is the range of decorative techniques utilised, and the breathtaking variety and ingenuity with which these techniques were employed. Gold wire is frequently used (and of course copper and silver wire are known) (Xanthoudides 1924, pl. VIII, 391). The complicated technique of granulation is seen, used to remarkable effect on some of the beautiful earrings from Troy and on a little toad-pendant from Koumasa in Crete (Schmidt 1902, 234; Xanthoudides 1924, pl. IV, 386). Indeed the range of techniques, as also of forms, invites comparison with the products of the same period at Ur.

Another decorative technique was that of punching little dots by means of hammering on the reverse surface, a kind of primitive repoussé work. The dots were ordered so as to form patterns or even scenes (Schmidt 1902, 232, no. 5875; Tsountas 1899, pl. 10; Seager 1912, fig. 9). Rather curiously, however, true repoussé work seems absent from the Aegean at this time. It emerges at the beginning of the middle bronze age in Crete and is well documented by the end of the middle bronze age (Seager 1912, fig. 38; fig. 31, XII, f.).

We may justifiably marvel at the achievements of these craftsmen, accomplished with rather limited means. Indeed the splendid finds of the Mycenaean period were based upon very much the same technical range. The development of repoussé technique has been mentioned, and engraving also became important in Mycenaean times. Sheet gold was used to cover some of the splendid carved vessels of steatite in the Late Minoan period, and tin to give pottery vessels the appearance of silver. Just two further innovations complete the late bronze age repertoire: that of niello (Singer, Holmyard and Hall 1954, I, 660), which allowed the decoration of the superb dagger blades of the Shaft Graves, and the invention of silver plating (Charles 1968), used to cap with silver the bronze rivets of some of the daggers and swords.

The basic metallurgical techniques employed in the third millennium Aegean have been discussed here at some length, in order to show that they developed in a logical manner from a long-standing neolithic tradition. With little alteration they furnished the basis for the impressive metalwork of the Minoan-Mycenaean civilisation.

The Development of Weapons in the Third Millennium BC

One of the problems concerning the development of Aegean metallurgy is to understand why it underwent its tremendous expansion in the Early Bronze 2 period. This boom was heralded, perhaps, by the abundant finds of Early Bronze 1 Thermi and Poliochni which we can regard as intermediate in their type-range between the neolithic/chalcolithic metal craft of the fourth millennium and the full industry of the later third millennium.

The appearance of the dagger perhaps presents a clue. For while the Aegean smiths of the final neolithic could make flat axes and awls, and their Balkan counterparts

shaft-hole axes, daggers are not seen (with the sole exception of the ineffective copper Bodrogersztur daggers of Hungary; Bognar-Kutzian 1965) anywhere in Europe until the inception of Aegean Early Bronze 2 period.

In Europe and the Near East, daggers and intensive bronze metallurgy are almost coterminous: the one scarcely exists without the other. The correlation is an extremely striking one, and it seems to explain, perhaps, why the 'metallurgical revolution'—the widespread production and use of metal objects—took so long to develop. The plain fact is that until daggers were invented, no metal product was so remarkable or original as to be indispensable. Stone axes were nearly as efficient as copper ones, and shaft-hole axes of copper were not an enormous improvement upon those of antler furnished with a stone working edge. The dagger, on the other hand, was a new form and one which could not be, or at any rate was not, produced in the Old World from obsidian. Flint daggers apparently make their appearance in Europe only after that of the metal dagger.

Connected with the appearance of the dagger is the discovery of alloying copper with tin (or arsenic) to make bronze. The increased strength and hardness which this produces were highly desirable when a robust yet rather thin blade was required. The new form, coupled with this technological advance, produced a universal military threat which could be answered only by equipping oneself with similar weapons. The analogy with the various twentieth-century arms races is obvious: just as every nation in the Levant needs tanks in the 1960s and 1970s, so every man needed a dagger during the bronze age.

DAGGERS

The origin of the Aegean dagger (fig. 16.5) is an important question for the prehistory of Europe. Effectively it makes its appearance in the Aegean in the Troy I period at Troy, Thermi and Poliochni (Dörpfeld 1902, fig. 262, a–c; Lamb 1936a, pl. XLVII; Brea 1964, pl. LXXXVI, a). No mainland, Cretan or Cycladic daggers can reliably be dated so early.

The earliest form is a flat, tanged dagger, with or without rivets in the tang, which is often pronounced and narrow (pl. 22, 3). In the Aegean this form is found only once outside the Troad, in the Euboia tombs (Papavasileiou 1910, 12, fig. 13). There it is another sign of western Anatolian influence in Early Bronze 3 times.

Sometimes in the Troad the tang is very wide, amounting simply to a marked reduction in blade width near the butt, a narrowing which is more pronounced than a simple rounding (Dörpfeld 1902, fig. 262, h–k). This form is again exceedingly rare elsewhere in the Aegean, although there is a single example from Chalandriani in Syros (Bossert 1967, fig. 2, 13).

In western Anatolia a wide range of such dagger forms is found, which Stronach (1957) has divided into seven types, depending on rivet arrangement, presence of central ridge and other details. None of them occurs in a context earlier than Troy I. Indeed

only a couple of small fragments indicate that the dagger may have been known in the Aegean or Anatolia before this time. The first of these is from Stratum IX at Emborio: the fragment is only 2.5 cm long and cannot with certainty be recognised as the tip of a dagger (Hood 1965a, and oral communication). The second is a fragment from the small hoard found in the chalcolithic levels at Beycesultan in western Anatolia (Lloyd and Mellaart 1962, 281, fig. F.8, 14). The hoard contained several awls and needles, as might be expected, and a silver ring, which in view of the remarks above occasions no surprise. The dagger fragments, some 4 cm long, had a low medial ridge. This hoard is certainly to be set earlier than Troy, but it may not be so early as the Emborio find.

At present then, while the possibility of influence from the Near East cannot be excluded, we may regard north-west Anatolia as an independent metallurgical centre, where the production of tanged daggers was early under way.

There seem to have been independent metallurgical centres likewise both in Crete and the Cyclades. The typical Cycladic dagger form (pl. 22, 6 and 7; fig. 16.5, types IVa and b) has a medial ridge or midrib, and either a straight (IVa) or a rounded (IVb) butt, without any kind of tang. In general there are two or four rivet holes. This form is not found in Syros but is exceedingly common in Naxos and Amorgos (Renfrew 1967a, 11). It is a common occurrence in mainland Greece and in Crete, where it corresponds to Types III and VI of Branigan's classification (1967a). It is not found at all in the Troad or the eastern Aegean (although one find at Poliochni could be regarded as an intermediate form between this and the tanged Anatolian dagger (Brea 1964, pl. CLXXI, b and d). The distribution of the type is thus virtually complementary to the tanged Anatolian forms.

The third major type is the Cretan short dagger with its very broad butt (fig. 16.5, Type IIIb). Its occurrence has been studied in detail by Branigan (1967a, 230 f.) He points out that 90 per cent of the 87 known daggers of this form were found in the Mesara, fully half of them in the round tomb at Aghia Triadha. There are no good prototypes for the shape. It probably developed locally in Crete, and was superseded by the 'long' dagger of Cycladic origin, which is so widely distributed in the Aegean. Branigan has rightly suggested that these artefacts might plausibly be regarded as knives rather than as daggers. The extensive wear on many of them supports this view. But their potential as weapons was always present.

The simple tangless flat dagger (fig. 16.5, Type IIIa), which unlike the Cretan short daggers is straight sided, completes the repertoire of the early Aegean daggers. All the other early forms of dagger (but not of spearhead) can be regarded as variants or elaborations of these types. This form (IIIa) is seen in the Cyclades at Chalandriani in Syros (Bossert 1967, fig. 2, 2), in Crete (Branigan 1967a, types I and II) and in mainland Greece (Sotiriades 1912, 27 and fig. 15; Blegen 1928, pl. xx, 5). Conceivably it may have been a prototype for Type IIIb, since the rivet arrangement is sometimes similar, and there is little to distinguish them when the medial ridge of Type IIIb is not prominent. Probably it was a prototype also for the longer daggers of Type V (Renfrew 1967a, 11) which became very popular in Crete and mainland Greece during the middle bronze age.

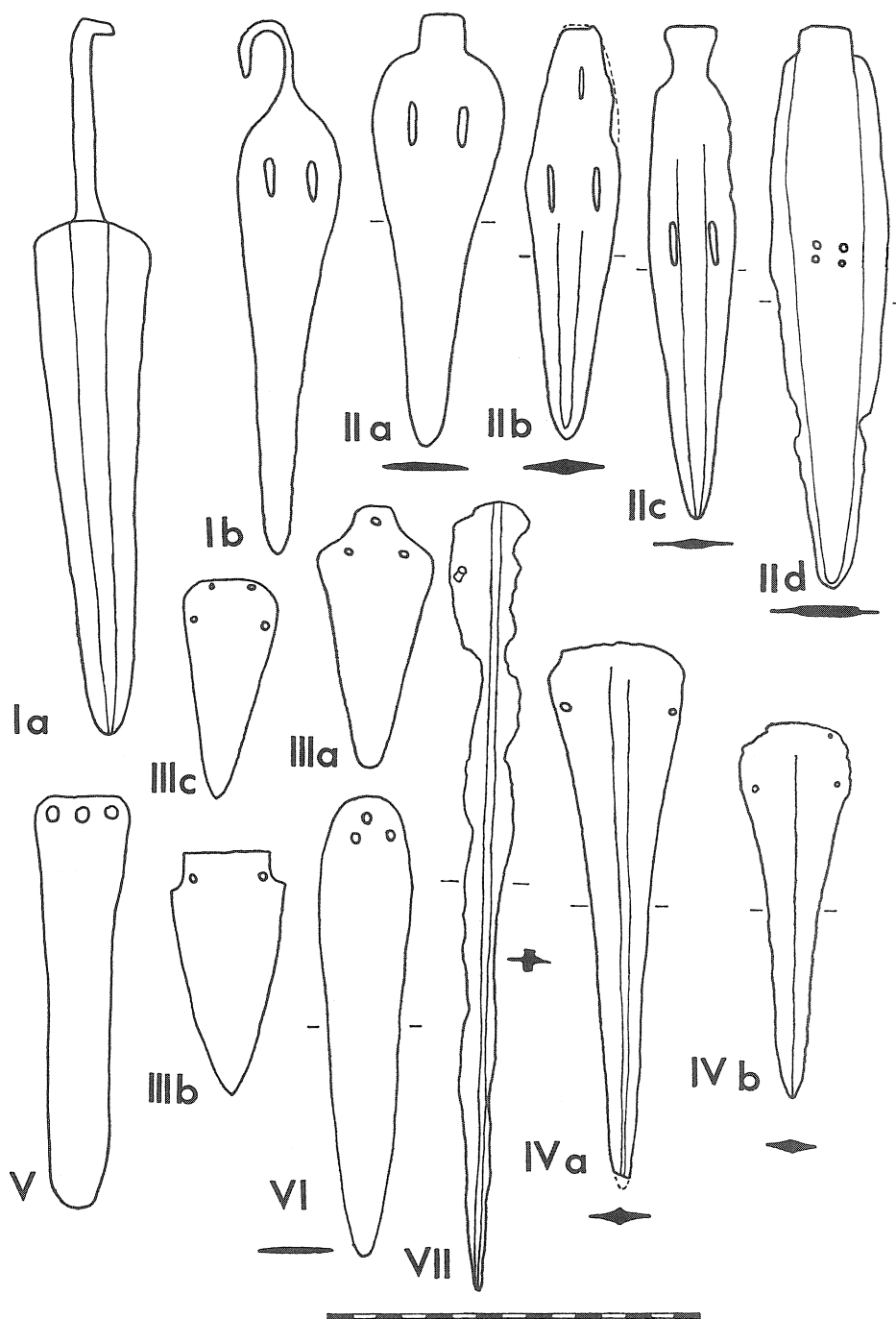


FIG. 16.5 Dagger and spearhead forms of the third millennium Aegean. Scale in cm.

SPEARHEADS

The second weapon which makes its appearance in the early bronze age is the spearhead. Conventionally all the weapons with slots or apertures in the blade, or with rat-tail tangs (Types I and II), are so termed, it being assumed that these were an aid in fixing the head firmly to the haft. Certainly the absence of rivet holes supports this view.

Once again, a wide variety of forms occurs in the Troad (Stronach 1957, 104). Type Ia has a wide distribution in Anatolia and Cyprus, and is scarcely found in the Aegean, while type Ib, the other form with a rat-tail tang, and with slots also, is found only once in the Aegean outside of Troy, on Amorgos (Renfrew 1967a, 10). Clearly the rat-tailed tang is not a feature widespread in the Aegean.

There are, however, two specifically Aegean types. The first of these, IIa, is flat, with sloping shoulders and elongated slots, and usually has a tang. Its earliest known occurrence, indeed the earliest find of a spearhead in the Aegean, is in Town IV at Thermi (Lamb 1936a, pl. xxv, no. 32.2): it is frequently found in the Cyclades (pl. 22, 9) and occurs at Levkas (Renfrew 1967a, pl. 11).

The spearheads with circular perforations in the blade (Type IId) are apparently chiefly from Crete (Branigan 1968a, 28), although one example comes from Amorgos. Again this is essentially an Aegean type.

Finally there are the spearheads with midrib of Type IIb and IIe, which differ from those already described. In the middle bronze age the shoe-socket spearhead is seen (Dörpfeld 1927, pl. 73), and the first true socketed spearheads appear in the late bronze age. Mention should be made also of the single metal arrowhead from the early bronze age Aegean, which comes from Mochlos (Branigan 1967a, 29), and whose date has been disputed.

The evolution of the Aegean spearhead, like that of the dagger, seems very much a local affair.

SWORDS

The later evolution of the dagger in the Aegean follows a predictable course, with a progressive lengthening of the blade to form the rapier or sword. The spear, on the other hand, does not develop very significantly as a weapon in the later bronze age, although the socket was a considerable improvement in hafting. The Cycladic dagger type, with its midrib, was the starting point in the evolution of the Aegean sword. While the Amorgos daggers of Type IV may be as short as 12 cm, lengths of more than 20 cm are common in the early bronze age. Gradually the midrib becomes more prominent, and the blade more slender, until the appearance is that of a rapier (pl. 22, 1 and 2; Renfrew 1967a, pl. 8, 68). A simple increase in length is now sufficient to convert this dagger into a sword (Type VII) (*ibid.*, pl. 8, 69; Sandars 1961, pl. 17, 7). The process is already well

under way in early bronze age times, as a find in a cist grave in Amorgos clearly shows (Tsountas 1898, pl. 12, 6).

A similar, perhaps parallel, evolution is seen in Crete where the Type IV daggers show a progressive lengthening; the developments have been discussed in detail in a recent paper (Branigan 1968d). Similar changes are seen also in Levkas where there is a wide range of form (Dörpfeld 1927, pl. 62, 63a). An essential innovation, a small tang—an extension of the midrib—is all that is needed to complete the Mycenaean Type A sword (Sandars 1961). This advance may have been suggested by the weapons of similar type seen at Byblos, and Branigan has indeed suggested some contact between the smiths of Crete and Byblos at the end of the early bronze age (1968a, 60).

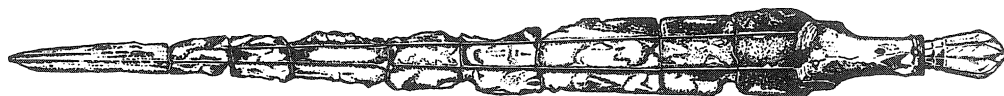


FIG. 16.6 Ceremonial longsword from the Middle Minoan palace at Mallia. The pommel is of rock-crystal. Length 101 cm (after Chapoutier and Charbonneaux).

Splendid early examples of the complete sword, one of them 81 cm long (fig. 16.6), come from the First Palace at Mallia (Chapoutier 1938, pl. 9). Sandars rightly calls this Type A sword 'a weapon of unsurpassed size and considerable magnificence.... The armourers of Egypt and the Levant could produce nothing to compare with them' (1963, 117–18).

Very closely similar (and also classed as Type A) are the swords with a less pronounced midrib. They have a flatter, broader central prominence (for example another splendid sword from Mallia; Chapoutier and Demargne 1928, pl. 1). Often there are elegant raised ridges running parallel to the central ridge, and on each side of it (Renfrew 1967a, pl. 5, 60 and 71). Convenient prototypes are seen in Crete (Branigan 1967a, Type X).

This evolution of the sword in the Cyclades and Crete seems, as we have suggested, to take place also in Levkas, where grave R7, apparently of the early bronze age, contains swords in association with a spearhead of Type IIa. They may be the earliest Aegean swords yet excavated (Dörpfeld 1927, pl. 62). The development in these three areas of the Aegean is thus analogous, and resembles that of the typical Anatolian tanged dagger into the two remarkable swords of the Alaca Hüyük burials (Sandars 1961, 19). These, like the Levkas swords, are of Early Bronze 2 date, and lack a midrib, just as do their prototypes. For this reason they are very much inferior to the Aegean swords of Type A. We have no need to postulate any connection between these evolutionary processes: there seems nothing more natural than a gradual increase in the blade length in each region, as the smith's forging skills improved. In each region the long sword evolved from its own local prototypes.

This rather detailed—although very far from exhaustive—discussion of the evolution of the Aegean weapon types serves to document their progressive local development. But while the military technology was vastly stimulated by the developments in metallurgy, it must be stressed that the precise reverse is just as true. The astonishingly rapid development of Aegean metallurgy was largely the consequence of military requirements. Weapons were the prime product of the Aegean early bronze age. The daggers of Crete, 253 in all (Branigan 1967a, 12 and 21), represent more than 50 per cent of the total copper or bronze objects which are known from Early Minoan times. The same is certainly true for Naxos and Amorgos in the Cyclades (although daggers were not placed in the graves in Syros). Without any doubt the dagger is the *Leitform* of early Aegean metallurgy—just as it is the *Leitform* of early metallurgy throughout the rest of Europe, from Beaker times onwards.

We discern again here positive mutual influence, positive feedback, between two systems, one technological, the other social: the enormously strong demand for daggers, once the type was established, must greatly have stimulated the development of metallurgy and its technology. Technology and demand were inextricably linked.

Metal Tools in the Aegean Early Bronze Age

The new weapons of the early bronze age transformed warfare in the Aegean. Ultimately, however, the new range of tools available may have had effects of still wider consequence. Metal axes, chisels and gouges opened entirely new fields to the carpenter and shipbuilder. Saws, chisels and gravers gave new opportunities to the lapidary and the sculptor, as well as to the architect.

Finds of tools are less commonly made than of weapons, since, during the early bronze age, metal tools were not often buried with the dead. Just a few hoards are known, however, and to these we must first turn in order to see the range of available implements (fig. 16.7). The major tool forms are then listed, and it is interesting to see that several of them fulfilled entirely new functions, made possible solely by the development of metallurgy.

HOARD 1

The hoard of Vano 829 at Poliochni is exceptional in containing weapons as well as tools (pl. 18, 1 and 2; 22, 3 to 5; Brea 1964, pl. CLXXI–CLXXIV). There are four splendid daggers, two of them of the typical flat Troadic type with narrow tangs. The other two are midrib daggers, one a variant of the same type with a narrowing of the butt instead of a tang, the other close to the Cycladic Type IV. Fragments of three further daggers were found with them, and three awls mounted in bone handles. The four handsome flat axes which, unlike those of the neolithic period, are relatively slim in section, attract our attention here. Perhaps the most significant object of all, however, is the splendid

shaft-hole axe (pl. 18, 2) with a sleeve shaft. It is altogether different from the copper shaft-hole axes of the Balkan Gumelnitsa complex (Renfrew 1969b, fig. 8, 1, 4 and 5) which one day may be found in the Aegean final neolithic. On the other hand, this find has several parallels with axes from the early bronze age of Bulgaria (*ibid.*, fig. 8, 6 and 7). The hoard may be set in the Early Bronze 2 period, and consequently this type makes its appearance earlier in the Aegean than in the Near East (Stronach 1957, 120; Deshayes 1960, 92).

This splendid group of objects epitomises for us the impact of bronze metallurgy, with its frighteningly new weapons and enormously improved tools, upon the Aegean early bronze age.

HOARD 2

The Kythnos hoard (pl. 17) contained by far the most impressive group of tools yet found in the Cyclades (Renfrew 1967a, 7). Again there were massive flat axes, three in number, with a perforated heel for mounting, and three large chisels (or narrow flat axes).

The shaft-hole tools are the most remarkable of the finds. The first of these is an axe-adze of a well-established type (Deshayes 1960, Type B), which occurs in the Korakou culture hoard at Eutresis, Hoard 4 in the present list. It serves to establish the date of the find. This type is different from the Near Eastern axe-adzes, lacking a sleeve at the shaft. It is different also from the Balkan axe-adzes of the Gumelnitsa complex, although it could be a direct development in bronze from this early Balkan copper form. The other three axes are impressive, heavy tools; their typology has been discussed in detail elsewhere (Renfrew 1967a, 7). The forms may well be of Aegean origin.

This find contains a considerable mass of bronze. The three flat axes weighing 943 gm, 712 gm and 711 gm respectively (*ibid.*, nos. 34–36), and the chisels 252 gm, 144 gm and 134 gm (*ibid.*, nos. 37–39). The axe-adze weighs 250 gm and the other shaft-hole tools, 1490 gm, 950 gm and 1250 gm. The flat tools thus total 2.9 kilos, and the shaft-hole tools 3.9 kilos, giving a total weight for the entire hoard of just less than 7 kilos, an impressive store of bronze. In view of these figures, which may be compared with 90 to 120 gm for a typical spearhead or dagger of Type IV, and as little as 35 gm for a dagger of Type IIIa or IIIb (*ibid.*, no. 65 weighs 35 gm; no. 60, 98 gm; no. 49, 110 gm), it is understandable that such objects were not often placed in graves, but melted down for re-casting.

HOARD 3

The Petralona hoard, the only important find yet to come from the early bronze age of Thessaly or Macedonia, comprises 10 flat chisels analogous to those of the Kythnos hoard, although shorter, and 2 chisel fragments (*ibid.*, 9). There are also 3 shaft-hole axes of the form seen in the Poliochni hoard. The Petralona hoard is thus very similar in its basic content, flat axes and shaft-hole axes, to the Kythnos hoard.

HOARD 4

The Eutresis hoard is a group of four objects, found in a pit in a context of the Korakou culture (Goldman 1931, 215). There is one heavy flat axe, of copper not bronze, and a narrow chisel of copper alloyed with 6 per cent of lead. There is an axe-adze of copper of the type already described, and a trowel or spatula, a thin slightly pliable blade of copper tapering somewhat towards a square end and narrowing towards the top for insertion into a wooden handle.

HOARD 5

The Thebes hoard contained flat axes, chisels, awls and a shaft-hole axe of the type occurring in the Poliochni and Petralona hoards (Platon and Stassinopoulou-Touloupa 1964). In addition there was a copper or bronze double axe, the earliest known occurrence of this form, unless a small copper or bronze double axe at Mochlos is of comparable date (Seager 1912, fig. 12, no. 11, 46).

HOARD 6

The Chalandriani (Kastri) hoard (fig. 17.2) has already been discussed. In addition to chisels, awls and needles, it included the blade of a saw (Bossert 1967, 62). Other saw blades are known from the Aegean at the same time: one, from a cist grave in Naxos, contained 2.6 per cent arsenic (Stephanos 1905, 224; Papathanasopoulos 1961–62, pl. 62, b).

HOARD 7

Treasure K at Troy was exclusively of bronze (Schmidt 1902, 241), and although generally included among the Troy 'treasures' would, in other circumstances, be regarded as a bronze hoard. It included four narrow flat axes, a dagger blade with the fragment of another, a bronze figurine discussed above, and an interesting openwork ring (Dörpfeld 1902, fig. 297) which is the only example at Troy of the metallurgical style so common at Alaca Hüyük. In addition there was a knife of a form rather common in the early bronze age, with a convex curving blade. The form is seen again at Eutresis, for instance, in the Korakou culture and in Town V at Thermi (Goldman 1931, fig. 286, 7; Lamb 1936a, pl. XLVII, no. 30, 9): its development has been discussed by Sandars (1955).

In addition to the seven tool hoards cited, the 'Great Treasure' at Troy, Treasure A, should be mentioned, since it contained several copper axes and chisels of common types (fig. 8.5; Schmidt 1902, 226). Grave 38 at Ormos Apollona in Naxos contained three large flat axes and a chisel (Papathanasopoulos 1961–62, pl. 77), while Grave 23 at

Aïla held the saw already mentioned, two long chisels of special shape (trunnion axes) and an interesting crescentic knife blade, sharp at both edges (*ibid.*, pl. 62).

There are no well-authenticated hoards of metal tools from Early Minoan Crete, although Branigan (1969c, 3, fig. 1) has made a good case for regarding the Selakanos finds (four double axes and two flat chisels) as an associated group. The group may, however, be of Middle Minoan date, as in all probability are the two further assemblages from Chamaizi and Samba.

These hoards are of considerable interest, offering as they do complete assemblages. Hoards 4, 5 and 6 were found *in situ*, probably very much as they were used. Hoard 3, on the other hand, which contains broken objects, may well be a founder's hoard, the earliest known in the Aegean. Hoards 1 and 7, in view of their varied contents, may represent the metal wealth of the owner, and were perhaps hidden away as such at a time of danger.

Founders' hoards are rare in the Aegean, even in the late bronze age, but it is again from these—notably those of Anthedon, Mycenae and the Athens Acropolis—that the full range of the everyday objects then in use becomes apparent.

RANGE OF AVAILABLE TOOLS

This survey of the tool finds recovered from early bronze age hoards enables us to compile a short and summary list of the tool forms then available. The repertoire was vastly greater than anything available to the craftsmen of the final neolithic period only a few centuries earlier. (In most cases other findspots are known.)

(A) SHAFT-HOLE TOOLS

1. Axe-adze. Kythnos and Eutresis hoards.
2. Sleeved shaft-hole axe. Poliochni, Petralona and Kythnos hoards. (A rather similar form of sleeved axe, more closely akin to those of the Balkans, is known from Amorgos; Renfrew 1967a, pl. 9, no. 40.)
3. Double axe. Thebes hoard.
4. Other shaft-hole forms. Kythnos hoard.

(B) FLAT TOOLS

1. Massive flat axe. Kythnos and Poliochni hoards.
2. Long narrow axe or chisel. Kythnos hoard, Ormos Apollona grave.
3. Small flat axe. Ormos Apollona grave, Paros, Amorgos, etc. (*ibid.*, pl. 9, 44 and 45).
4. Small narrow chisel. Kastri hoard and other finds.
5. Spatula. Eutresis hoard.

(C) OTHER TOOLS

1. Saw. Kastri hoard, Aïla grave.
2. One-edged knife. Troy Treasure K, Thermi, Eutresis (Goldman 1931, fig. 286, 7).

3. Two-edged knife. Ana grave.
4. Sickie. Amorgos (possibly later than early bronze age in date) (Renfrew 1967a, pl. 9, 46).
5. Fish hook. Syros, Eutresis (Tsountas 1899, pl. 10, 38 and 39; Goldman 1931, fig. 286, 6).
6. Borer. Amorgos (Renfrew 1967a, 18, no. 18; Blinkenberg 1896, 44, fig. 10) and numerous sites in the Aegean.
7. Awl (Quadrangular section.) Thermi (Lamb 1936a, 168) and numerous other sites.
8. Needle (with eye). Chalandriani (Tsountas 1899, pl. 10, 22; Doulmas 1969, 163, no. 267).
9. Punch. Troy (Schmidt 1902, 25, no. 6240).
10. Gouge. Troy (*ibid.*, no. 6232).

(D) TOILET ARTICLES

1. Tweezers. Numerous sites throughout the Aegean (figs. 11.3 and 16.7).
2. Scraper. Syros, Crete (Tsountas 1899, pl. 10, 30–34; Branigan 1968a, 36) and other areas (fig. 11.3).
3. 'Razor'. Doubtful occurrence¹ except in Crete.

(E) OTHER OBJECTS

Pins are considered with the jewellery in the next section.

Among figurines, only one, from Treasure K at Troy is of copper or bronze: the others are of lead.

Metal seals occur at Poliochni and Thermi (Brea 1964, 663 and pl. CXX, 4; Lamb 1936a, 172 and pl. 25). The design is the angle-filled cross, the commonest in early Aegean glyptic.

This impressive repertoire of tools establishes the basis for the tool kit of the later bronze age. Naturally there were developments and modifications: saws became much bigger, for instance, and the knife became common—probably the functions of knife and dagger were first clearly separated in the middle bronze age. But a glance at Deshayes' monumental survey (1960) of east Mediterranean tools indicates that only a few forms are needed to complete the full Minoan-Mycenaean repertoire, specifically sickles (for the Amorgos specimen cited is without a context), cleavers and wrought socketed tools like that from the Anthedon hoard (Rolfe 1890, 105, pl. xv, 5). Essentially then, the basic range of types was developed during the early bronze age.

Clearly this must have had an impact on a whole range of crafts, although it was probably not until the late bronze age that metal tools such as the sickle were widely used in agriculture. But carpentry must have been transformed, and leather working, and above all the crafts where stone was worked by sculptors, vase makers and seal

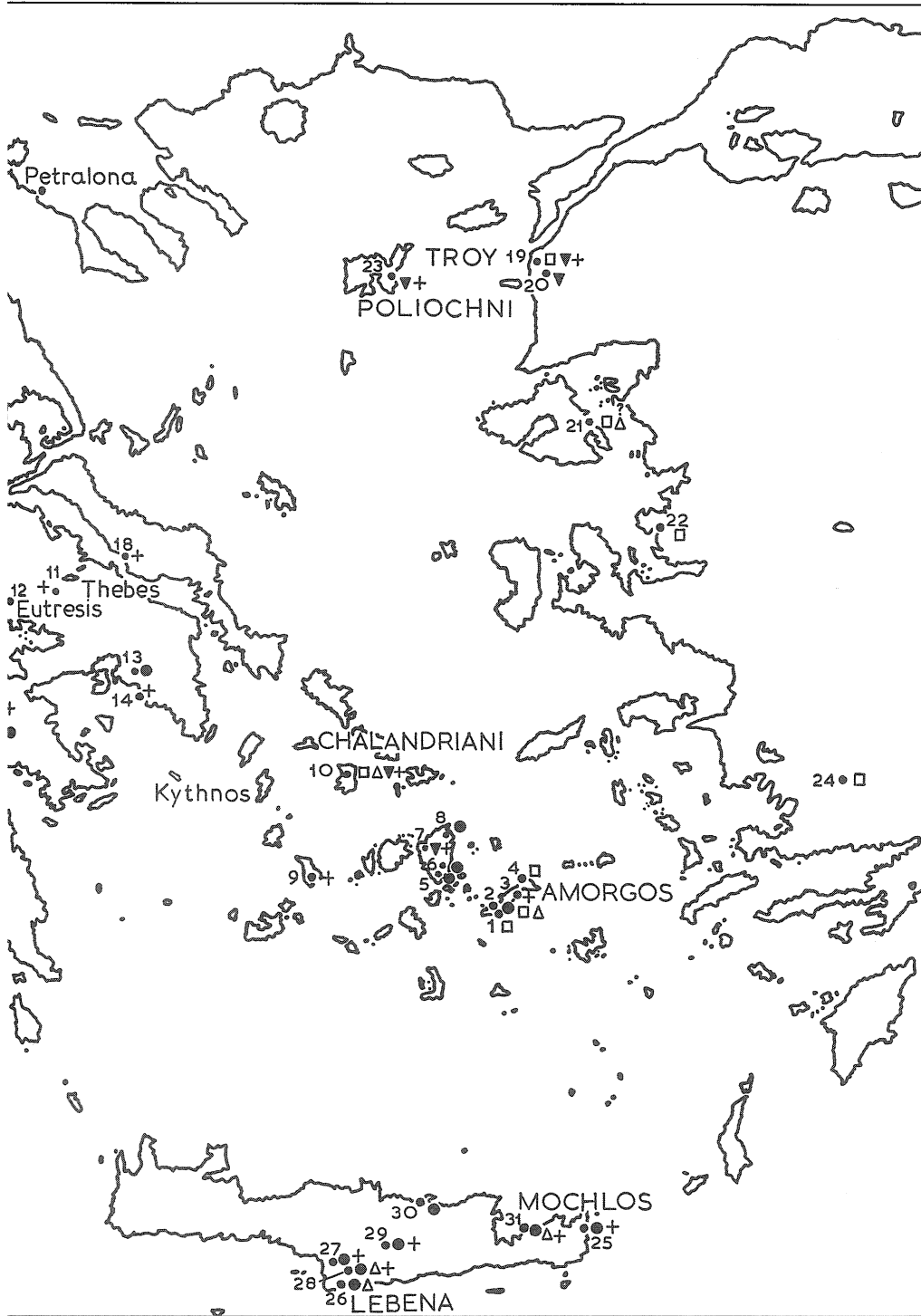
¹ Branigan (1968a, 40) gives good reason for thinking that some objects found in Crete were razors, but the arguments are not convincing for the Cycladic instances cited (Tsountas 1899, fig. 11 and pl. 12, 3).

FIG. 16.7 Important metal finds in the third millennium Aegean. The map shows the location of rich finds (including quantities of gold or silver), of major tool hoards and of certain types with widespread distribution.

1, Stavros; 2, Dokathismata; 3, Kapsala; 4, Arkesine; 5, Karvounolakkoi; 6, Panormos; 7, Naxos, uncertain location; 8, Apollona; 9, Akrotiraki; 10, Chalandriani; 11, Thebes; 12, Eutresis; 13, Athens; 14, Aghios Kosmas; 15, Zygouries; 16, Korakou; 17, Lerna; 18, Manika; 19, Troy; 20, Hanaytepe; 21, Thermi; 22, Larisa; 23, Poliochni; 24, Ahirköy; 25, Palaikastro; 26, Lebena; 27, Aghia Triadha; 28, Platanos; 29, Kalathiana; 30, Pyrgos; 31, Mochlos; 32, Steno.

Other sites in Crete with tweezers are: Koumasa, Priniatikos Pyrgos, Siva, Sphoungaras; with type IV daggers: Gournia, Koumasa, Krasi, Salame, Siva.





engravers. The awl, the borer, and the chisel were the dominant tool types and they suggest that the great value of metal tools was the increased versatility afforded in the working of other materials: wood, leather and stone. The development of metallurgy offered great opportunities to specialists in other crafts.

Jewellery and Plate in the Third Millennium Aegean

The third great consequence which the development of metallurgy had upon the Aegean world, as well as promoting warfare through the impact of weapons, and craft specialisation through the provision of new tools, was to encourage wealth and display. Adornments of gold and silver were worn by both men and women. Services of drinking vessels were among the most prized possessions of the rich and prominent in society. Now, for the first time in the Aegean, it is possible to speak of wealth. The splendid range of new forms which appeared at the time must now be reviewed.

JEWELLERY

Metallurgy offered, perhaps for the first time, enormous scope for finery. Previously only textiles and stone adornments were available to brighten personal appearance. This point is considered again in later chapters, for it is relevant to wealth and to social topics. Here the aim is simply to document the range of forms.

(A) PINS

The pins are very varied (fig. 11.3). Among the most common are those with round-headed heads (Tsountas 1899, pl. 10, 11 and 17; Blegen 1928, pl. xx, 16) and pyramidal heads (Tsountas op. cit., pl. 10, 18; Blegen op. cit., pl. xx, 17). Vase-headed pins are sometimes found, in Syros for instance and in Naxos. An elegant little pin from Chalandriani in Syros had a jug head (Tsountas op. cit., pl. 10, 10; cf. for Thyreatis, Higgins 1961, 53 and pl. 1). The double-spiral-decorated pin, which is already seen in the Balkan copper age, had a wide distribution, indicated on fig. 16.7. Examples from Zygouries and Poliochni (Blegen 1928, pl. xx, 9; Brea 1964, pl. LXXXVI, e) are made of silver. Pins with complicated heads decorated with many loops of copper are found in Syros, in Naxos and in Troy (Tsountas 1899, pl. 10, 18 and 21). A beautiful silver pin with a standing animal ornamenting the head comes from Amorgos (fig. 18.1, 4; Tsountas 1898, pl. 8, 66; a pin with bull's head from Thyreatis, Higgins 1961, 53 and pl. 1). Bird-headed pins are known from Syros and from Thermi in Lesbos (Tsountas 1898, pl. 10, 13; Lamb 1936a, pl. XLVII, nos. 13–19). Of special note are four gold hairpins from Mochlos in Crete, ornamented with petals and resembling daisies (fig. 6.8; Seager 1912, fig. 43, XIX, 11). The most splendid examples, in gold, are from Troy and especially Poliochni. Vase-headed pins, and pins ornamented with one or two pairs of spirals are found, and a splendid pin with elaborate filigree spi-

rals is surmounted by six little vases (Schmidt 1902, pl. II, 6133). The important gold treasure of Vano 643 from the Poliochni Yellow phase, contemporary with Troy II, contained an elaborate dress pin (pl. 18, 5; Brea 1957, pl. III). Its magnificent head, nearly as broad as the pin is long, is decorated with two birds antithetically placed, one on each side of the pin shaft. It is important in showing figurative elements, rare in the gold work of the time, and foreshadowing some of the gold of the Aegina treasure in the Middle Minoan period.

(B) BRACELETS, RINGS AND BANGLES

Bracelets are found in all areas of the Aegean. The Cycladic ones are chiefly of silver; some are also of lead. There are three principal forms: the torque of twisted silver used as a neck ring or arm bangle, the flat bracelet of concave section, and the simple bangle of circular section, formed from a long rod of silver (Renfrew 1967a, 6). Arm spirals are simply bangles of this kind extended to give several loops, in helical arrangement. The Levkas tombs include rings and spirals of similar form, chiefly of silver (fig. 18.3; Dörpfeld 1927, pl. 60, 8). The Cretan jewellery is chiefly of gold, and the method of working was presumably by hammering rather than by casting. In consequence the forms are not of the solid kind encountered in the silverwork of the Cyclades and the mainland. Instead the bracelets at Mochlos were largely of some perishable material, perhaps wood, covered in sheets of gold which was embellished with simple geometric *repoussé* decoration (Seager 1912, fig. 8 and 20). In the Troad we see both techniques: Poliochni yielded a bracelet torque of gold, as did the Troy treasures (Brea 1957, fig. 32; Schmidt 1902, pl. II, no. 6131). Bracelets were made too of beaten gold, thicker than in the case of the Mochlos bracelets, and this time not modelled on a wooden core. One justly famous piece is ornamented with filigree spirals in an elaborate manner (Schmidt 1902, pl. II, 6003).

(C) DIADEMS

Diadems of great beauty are found. One, from Amorgos, is of beaten silver, ornamented above and below with openwork zig-zags produced by punching holes in the metal (fig. 18.1, 2; Tsountas 1898, pl. 8, 1). The fine silver diadem from Chalandriani (fig. 18.1, 1; Tsountas 1899, pl. 10, 1) is ornamented with a series of repoussé dots, which form a design showing two quadrupeds arranged symmetrically one on each side of, and facing, a central disc. Outside each is a further disc and outside this again a human with upraised arms—a rare example of a figure group. The gold diadems of Mochlos are decorated in the same repoussé technique and show the same symmetrical arrangement in the decoration. One is embellished with two eyes, another with four animals, apparently dogs (Seager 1912, fig. g).

It is possible that pendant chains of gold hung from some of these diadems. Certainly at Troy a magnificent diadem had a whole series of little pendants on chains, which combined to give a very elaborate effect (Schmidt 1902, 5876). This

splendid diadem of gold was doubtless the prehistoric equivalent of the modern diamond tiara.

(D) NECKLACES

To some extent necklaces of metal beads superseded the principal item of adornment of neolithic times, which was the necklace of stone beads. Only in Crete, where the love of beautiful stones continued uninterruptedly from Early Minoan times right through to the end of the prehistoric period, do we see sumptuous necklaces of stone beads (Seager 1912, fig. 25). Gold beads are also very common.

In the Cyclades, indeed, necklaces are rare: there is an early one of little silver beads from the Louros grave (Papathanasopoulos 1961–62, pl. 67), and attractive beads made of rolls of silver sheeting come from Amorgos (Renfrew 1967a, pl. 4, 23). The rich R graves of Levkas have produced the most important finds (fig. 18.3; Dörpfeld 1927, pl. 60). The beads are hollow, of beaten gold. The Thyreatis treasure contained a necklace of splendid gold beads, probably of the same date (Higgins 1961, 50–53).

The Troy treasures, once again, have yielded a rich variety of beads, and especially of little pendants of sheet metal, which were parts of necklaces.

As well as beads, there are small pieces of sheet metal at various sites, notably Troy and Mochlos, which may have been used to decorate the hair, in common with some of the pins described (Schmidt 1902, 236, d; Seager 1912, fig. 11, II, 24).

(E) EARRINGS

Earrings are not so widely distributed as some of the other forms of jewellery. No undoubted metal earrings have been found in the Cyclades, although of course many of the stone beads may have been suspended from the ears. Metal earrings are apparently not found at this time in Crete: at any rate they are absent from Mochlos and the Mesara. But single examples of gold were found in two graves at Zygyouries, leading Blegen to suggest that at this time the fashion may have been to wear only a single earring (1928, 181 and pl. xx, 7 and 11). Simple earrings of gold were found also at Levkas (fig. 18.3, 3; Dörpfeld 1927, pls. 60 and 61). It is again at Troy and Poliochni that the most magnificent samples are found. At Poliochni are splendid earrings with four golden chains terminated by a pendant (Brea 1957, pl. III and figs. 26–27). Similar sumptuous work is seen at Troy (Schliemann 1880, 486, nos. 822 and 823; 489, no. 847; Schmidt 1902, pl. II). It is possible that some of the pendants at Mochlos served the same purpose (fig. 6.8; cf. Seager 1912, fig. 11, no. II, 30).

This, then, completes the rapid survey of the repertoire in jewellery. What is especially impressive is the magnificent effect achieved, especially by the craftsmen of Crete and the Troad, with rather limited technical means. It should be noted that filigree work is seen only in the Troad, and granulation there and in Crete, although both techniques are rare.

Troy was pre-eminent in the crafts of the jeweller. And the resemblances between the Troy jewellery and that of contemporary Near Eastern sites, notably Ur, are inescapable (Bass 1966; Maxwell-Hyslop 1960). Clearly there was exchange of ideas between smiths in these two regions, doubtless through some exchange of goods. At present however it is enough to note the magnificence of the finds, and to imagine their effect upon the women (and the men) of the time. They certainly laid the foundations for the finery of subsequent periods, documented by the Shaft Graves of Mycenae, and especially by the superb pendant from Mallia (pl. 18, 4).

METAL VESSELS

Vessels of beaten gold, silver and bronze have been found in all the main areas of the southern Aegean, although of course such finds are exceedingly rare. It has been suggested that such vessels may have already been made in neolithic times in the Aegean, but in fact there is absolutely no evidence to support such a claim. Some neolithic ceramic shapes of the Larissa culture have been claimed as 'metallic' by some writers. But it is difficult to see why, and the vessels in question do not show the asymmetrical features common in metal vessels, such as a prominent handle. It is during the early bronze age, on the other hand, that such features become evident in the pottery, and the close identity between the metal and ceramic forms indicates that such influence is now occurring.

The principal metal forms are jugs, cups and bowls. And from the Troad we can add buckets and curious handled dishes, which are related in their shape to the 'frying pans' of the Cyclades.

(A) BOWLS

Bowls have been found in the Cyclades: one, from a grave in Amorgos, is of pleasing simple form, broad and rather low in profile (pl. 19, 5; Renfrew 1967a, pl. 10, 17). Two other silver bowls of this shape, but with incised decoration, are known, although they are without provenance (*ibid.*, pl. 10, e). A further silver bowl, although in fragmentary condition, decorated with deep grooves, was found at Dokathismata in Amorgos (Tsountas 1898, pl. 8, 3). Another in the Goulandris collection (pl. 19, 6; Doumas 1969, 170, no. 313) has a diminutive ring base, comparable with those of the pottery bowls of the Korakou culture. A simple silver bowl was found at Troy (Blegen et al., 1950, fig. 359). The Benaki Museum in Athens possesses gold and silver bowls possibly from Euboea, which may be of the same date (Segall 1938, pls. 1-3 and 67-69). They are deeper, and again decorated with grooved incisions.

Crete too has yielded metal vessels of this period. A hemispherical bowl from Mochlos, of diameter 5.6 cm is decorated with rows of beading around the lower half (Seager 1912, fig. 22, no. VI, 8). There is a lead bowl from the Trapeza Cave (Pendlebury et al., 1936, 109, fig. 22) and a bronze bowl from Mochlos, which Seager (1912, fig. 26, no. VII, c) assigned to the Early Minoan III period.

A bronze bowl from Troy is of especial interest for its exceptional size (Schmidt 1902, 225, no. 5818). With a diameter of 43.5 cm it is no longer a lordly dish for the table but a functional object, heralding the great bowls and cauldrons of the later bronze age.

(B) CUPS

Cups of pottery are especially numerous at this time. Many of the forms can be shown to have metal prototypes. The *Leitmotiv* of the Korakou culture is the pottery 'sauceboat', and its prototype is preserved in a splendid golden find from Arcadia (pl. 19, 3; Childe 1924). The most famous of the Troy II forms, the *depas amphikypellon*, likewise had a metal prototype of which an example in silver is preserved (pl. 19, 1; Renfrew 1967a, pl. 12). The form was later imitated in marble also.

In the Cyclades the most popular cup was the simple one-handled cup which has a wide distribution (fig. 20.4 and 20.5). We find a cup of precisely similar form but in silver at Troy (Schliemann 1880, 467, fig. 779). The beaker, on a stand base and with one handle, seen at Syros and Siphnos (pl. 7, 4; Tsountas 1899, pl. 8, 3 and 4) is found in electrum at Troy, although without a handle (Schmidt 1902, 231, fig. 5864). And finally the chalice, or high-footed cup, seen in pottery at Syros (pl. 7, 5; Tsountas 1899, pl. 8, 6 and 13) and in marble also (pl. 6, 2; *ibid.*, fig. 24; Doumas 1969, 67, no. 210, and 68, no. 211) was found in silver in a grave at Notina in Amorgos (Dümmler 1886, pl. 1, 4).

(C) JUGS

The jug was a major ceramic innovation of the time. One form, frequent in the Amorgos group of the Keros-Syros culture (Tsountas 1898, pl. 9, 26), finds a golden counterpart, although lacking a handle, at Troy (Schmidt 1902, 230, no. 5862). The more common jug form in the Cyclades is less dumpy in appearance, and has a longer neck (pl. 6.3; Tsountas 1899, pl. 8, 10). The remains of a little silver jug from south Naxos, apparently originally of this form although now squashed, are preserved in the Apeiranthos Museum. And of course a splendid golden jug of this form was found in one of the Royal Graves at Alaca Hüyük (Akurgal and Hirmer 1962, pl. v).

(D) BUCKETS

Bronze buckets have been found at Troy and in the Troad (Schmidt 1902, 226, no. 5819; Bittel 1959, 8, fig. 9). In several cases there was a spout protruding from the middle of the body, so that the vessel might be better described as a ewer.

(E) PATERAE

Various examples of a curious handled dish have been found in the Troad, and at Troy (Bittel 1959, 6; Schmidt 1902, 225, fig. 5817, with the handle, p. 226, fig. 5822). The pan rises in the centre in a large boss, and is of beaten bronze. Pans of roughly analogous shape but apparently cast, and without the boss, were found at Alaca

Hüyük (Mellink 1956, pls. iv–vi). These, although undecorated, are so similar in shape to the ‘frying pans’ of the Keros-Syros culture, that some similarity in function seems likely.

The elegance of some of these forms, and their profusion in the treasures of Troy are exceedingly impressive even today. The great impact which they must have had upon the inhabitants of the third millennium Aegean is eloquently attested by their flatteringly numerous imitations in pottery. The significance of their influence in the Aegean world is considered in later chapters.

Regional Metallurgy in the Aegean

In stressing the numerous links which the metal finds establish between one region and another, it is important also to emphasise the important differences between the various areas. The affinities and links will again be considered in Chapter 20.

The division of the early bronze age Aegean into cultures was emphasised in the first part of the present work. The Aegean was not a unity at this time, nor did it really become one, except for a brief moment in the late Mycenaean period, until the time of Alexander the Great. Each area had its own traditions and customs. This is true also of metallurgy.

Crete in particular had a marked individuality, with the broad, short daggers, which are not seen elsewhere. Very striking in Crete also is the total absence of flat axes, which is not likely to be a product solely of chance, since they are found so often in other areas. This Cretan individuality, which Branigan has emphasised, is seen also in the jewellery: nearly all the gold work is from sheet gold, and the charming petals and flowers of gold are not seen in other areas. The absence of earrings has already been noted, as well as the Cretan love for coloured stones. Nor is there, in the middle bronze age, anything elsewhere in the Aegean to compare with the beautiful Mallia bees (pl. 18, 4), or the pommel of the Mallia sword (Chapoutier 1938, frontispiece).

The Cyclades are distinguished by the absence of gold—which surely argues in favour of the exploitation of local raw materials in each area. The most frequent dagger type, as in mainland Greece, is the midrib dagger of Type IV. This is unusual in the Troad. On the other hand, the Trojan tanged dagger is scarcely seen in the Cyclades or in mainland Greece.

Mainland Greece has yielded relatively few metal finds, although the gold ‘sauceboat’, a Helladic and Cycladic form, is outstanding. The Levkas graves do, however, show some interesting features, including a wealth of gold. The gold sheeting used to cover the hilts of the daggers there (fig. 18.3, 1; Dörpfeld 1927, pl. 61a and b) with its spiral decoration is not seen elsewhere in the metalwork of the Aegean.

The Troad, the richest of the regions metallurgically, shows also the greatest range of metal types. But they are not universally imitated. The tanged daggers are essentially

Anatolian, and are not popular elsewhere in the Aegean. And significantly, perhaps, the sword is not seen at Troy, nor is there the progressive lengthening of the dagger which initiates its development in Crete, the Cyclades and mainland Greece.

The Troy jewellery eschews decoration on the surface of the metal itself, preferring the applied filigree ornaments which are not seen elsewhere in the Aegean. So we do not see the figurative designs in repoussé observed in the diadems of Mochlos and Syros. Nor, with the exception of one pin (Schmidt 1902, pl. II, 6134), are there the flower motifs of Mochlos. Only the Poliochni pin with its flanking birds shows a more ambitious conceptual scheme.

Each region, then, seems to retain some measure of individuality, despite the considerable intensity of trade and the exchange of ideas. Of course this is not surprising, for each region was already metallurgically competent in neolithic times—Kephala in the Cyclades, Knossos in Crete, Emborio in the eastern Aegean, and Sesklo and Alepotrypa in mainland Greece, are all dated to before 3000 BC. Sitagroi has copper nearly a millennium earlier. Metallurgy grew up in each region, although strongly influenced by the others. If there was a *Metallschock*, a sudden reaction produced by the first impact of metallurgy and metal products upon the populace, it was a shock which was locally inspired and produced.

This outline survey of the rise of Aegean metallurgy brings out several important aspects of its development. Its long antecedents in the neolithic period reveal it as largely a local process, although individual specialised techniques may have been acquired from overseas. The developments in the Early Bronze 2 period were so successful that by the end of this time all the major techniques later used by the Mycenaean metalworker were already available. These techniques resulted in the production not only of new tools but of new weapons, militarily decisive, and a dazzling range of luxury products. We shall see that warfare became, as a consequence, more complex and more serious. And wealth took on a new meaning.

The many effects of metallurgy upon other fields of human activity, upon other systems of the Aegean world, cannot be appreciated without considering the effects of these systems upon metallurgy. Only in this way can we hope to understand how it was that the fundamentals of metallurgy were known for so long in the final neolithic period to no striking effect, and how the development, when it did come in the early bronze age, was such a rapid one.

Chapter 17

Craft Specialisation and the

Transformation of the Physical Environment

The rapid development of metallurgy in the third millennium BC, and the variety of new products (as detailed in the last chapter) gave a new meaning to the notion of 'goods'. There was now, for the first time, a whole range of valuable objects worth hoarding in quantity. This particular consequence of metallurgy, a transformation in the idea of wealth, establishes it as the most important craft of the time. Metallurgy was, however, only one of those crafts in the third millennium BC whose whole nature was being changed. They were in turn changing the human environment.

A whole new world was coming into being, a world of new activities and new occupations, where man's control over nature was developing in a number of ways. The first consequence of the development of craft skills was that no one man could be, or indeed would wish to be, proficient in all of them. Craft specialisation was beginning. Although it did not yet entail the division of the work force into specialist and organised 'trades' like medieval guilds, it has left clear traces in the archaeological record.

Such specialisation favoured the development of further skills, and a whole new range of products. During the previous few millennia men had become more proficient at using the mineral, animal and plant resources which were at their disposal. The chipping of stone and the shaping of wood, the tanning of hides and the spinning of wool, the baking of bread and no doubt the fermentation of beer, were already neolithic skills. So, above all, was the production of man's first synthetic material: pottery.

In the third millennium BC the traditional crafts were transformed: metal tools opened a new range of possibilities for the stonemason and the carpenter, who were joined now by the shipbuilder and the wheelwright. Textile production may have become an industry rather than the task of every housewife. Wine, oil and perfume were new vegetable products. Advances in pyrotechnology made possible metallurgy and the production of less important materials such as faience.

Man in consequence could live, by the late bronze age, in a building of dressed stone, provided with wooden furniture, drained by a carefully planned system of pipes, and

artificially lit (fig. 21.3), although admittedly these facilities were available only to the chiefs and the leaders of society. He wore well-woven clothes of dyed wool. He travelled in well-built ships, and on land by chariot. He lived now in a world of created objects, of artefacts. It is this material world which we must now briefly examine.

Craft Specialisation

In the simple village economy of neolithic times there may have been few specialists—nearly every active working man will have possessed nearly all the basic skills known to the community. These were primarily farming skills, but everyone was also a handyman, able to build his house, tan animal hides, probably trim a flint knife. He or his wife could also spin and weave, shape pots, and probably fire them.

This, at any rate, is the simple picture often painted of 'neolithic man', a picture of a self-sufficiency which Robinson Crusoe himself could hardly surpass. And very possibly it does correspond to some extent to the life in an early neolithic farming village. Yet even early neolithic Nea Nikomedeia had its finely shaped figurines, its carefully carved 'stamp seals' of stone, and large, handsomely polished axes. The carving of Spondylus bracelets in later neolithic times required considerable craftsmanship. These all reflect a special skill, which not all members of the community will have possessed.

Some of the pottery of neolithic times—the handsomely painted ware of the Proto-Sesklo and Sesklo cultures, the elaborate decorated pottery of the Dikilitash culture—is so accomplished that it cannot have been made by inexperienced hands. We may doubt whether a single household would require, through breakages in its store, so much pottery as to necessitate firing a kiln so often as once per year. It seems unlikely that these masterly pots could be created on so casual a basis, and perhaps more probable that one or two people in the village 'kept their hand in' by making pottery for other households. In this sense they were already specialists, although only a fraction of their productive time was devoted to this craft. Even the simplest neolithic village economy favoured the existence of casual and part-time specialists in this sense.

Unfortunately this discussion is at present on the level of simple speculation. One of the great needs now in archaeological research is to establish who made the pottery for a village or even for a region, and to determine to what extent there was specialisation in other crafts in neolithic times. Meanwhile it seems legitimate to contrast the neolithic crafts with those of Minoan-Mycenaean times. We have seen already how certain specialists in the palace household were issued with rations. Their craft was therefore their livelihood. Whatever this social status ('semi-free', 'slave', etc.) they were mercenaries in this sense and they did not have to concern themselves with food production. Society had passed beyond a subsistence economy.

By Minoan-Mycenaean times subsistence was thus no longer the prime or sole concern of all the community. One of the most interesting aspects of the third millennium Aegean is that during the period this crucial transition was taking place. The growth in

the crafts was made possible by agricultural efficiency, but it depended far more upon the emergence of new techniques, especially those of metallurgy, and of an increased interest in and demand for the finished products.

By Middle Minoan times the palaces were centres of large enough size to support resident full-time craftsmen. There are what seem to be ration tablets in Minoan hieroglyphic script, which may refer to their food, and the workshops of Mallia document their place of work. The workshops there, in Quartier IV, of Middle Minoan date, were devoted to stone carving and metalwork (Chapoutier and Demargne 1942, 24 and 53). Raw materials (including obsidian) and partly worked marble slabs were found, together with a series of stone moulds for casting bronze tools and bronze sheeting (fig. 16.4), ample indication of specialisation.

Numerous comparable workshops of late bronze age date are known from the palaces (Warren 1967b, 199). The specialist occupations revealed by the Ventris decipherment of the Linear B tablets include: mason, carpenter, shipbuilder, bronze smith, bow-maker, chariot-builder, potter, carder, spinner, weaver, flax-worker, fuller, tailor, unguent boiler, goldsmith, and stoker (of what ?) as well as occupations concerned with subsistence or the farm such as shepherd, goatherd, huntsman, wood-cutter, baker and ox-driver, and personnel such as messenger, herald, bath attendant and serving woman (Ventris and Chadwick 1956, 123). To these occupations the material finds certainly add scribe and fresco painter.

Perhaps the most vivid indication of the extent to which craftsmen were committed specialists is given by some of the late bronze age burials, especially in Crete. The Zapher Papoura cemetery at Knossos contained a series of burials with a wide variety of grave goods. Many of the graves, with their rich weapons, can be regarded as warrior graves—one of them was termed ‘the Chieftain’s Grave’ by Evans. They are discussed in the next chapter. But some were not of this kind. The most interesting, perhaps, is the ‘Carpenter’s Tomb’. This was a simple shaft grave without any of the finery seen in some of the other burials (Evans 1905b, 440). The grave goods consisted simply of a bronze chisel—the successor of the chisels in the Naxos graves of the early bronze age—a leaf-shaped razor, and a great bronze saw, 48 cm in length (fig. 17.1).

Another burial, the ‘Hunter’s Grave’, contained a razor, a knife, a painted vase and fifteen small bronze arrowheads (*ibid.*, 421). This does not by any means prove that the occupant was a full-time huntsman such as those mentioned in the Linear B tablets, yet this was not a rich or aristocratic burial, and the grave goods may be regarded as utilitarian rather than facilitating a life of luxury. Another grave in this cemetery, that of a musician, is mentioned in chapter 19.

A grave in the Mavrospelio cemetery near Knossos likewise indicates specialisation, this time perhaps of a gem-cutter or at least someone working with precious materials. Grave III was of Late Minoan III date (Forsdyke 1927, 254). In addition to pottery braziers, a cup and a flask, nine stone bowls, a terracotta figurine and various beads, it contained some less usual equipment. Two razors of bronze, bronze tweezers and a mirror disc may have formed the toilet kit of the deceased. There were also bronze

scales, consisting of scale arm and handle with two pans, and three lead weights. Two crystal lenses, with a magnification of $\times 10$ may have formed part of the craftsman's personal kit (Beck 1928, 329). A bronze knife and ivory pommel were also found.

Specialisation of this kind was not limited to the entourage of the great, or to rich centres. Gournia, which is a town with only a small palace at the centre, gives the clearest picture offered by any settlement of the late bronze age, of the various craft occupations (Boyd Hawes 1908). Hutchinson (1962, 287) describes the settlement as an 'industrial town' and categorises the 'palace' as little more than a village 'turned into

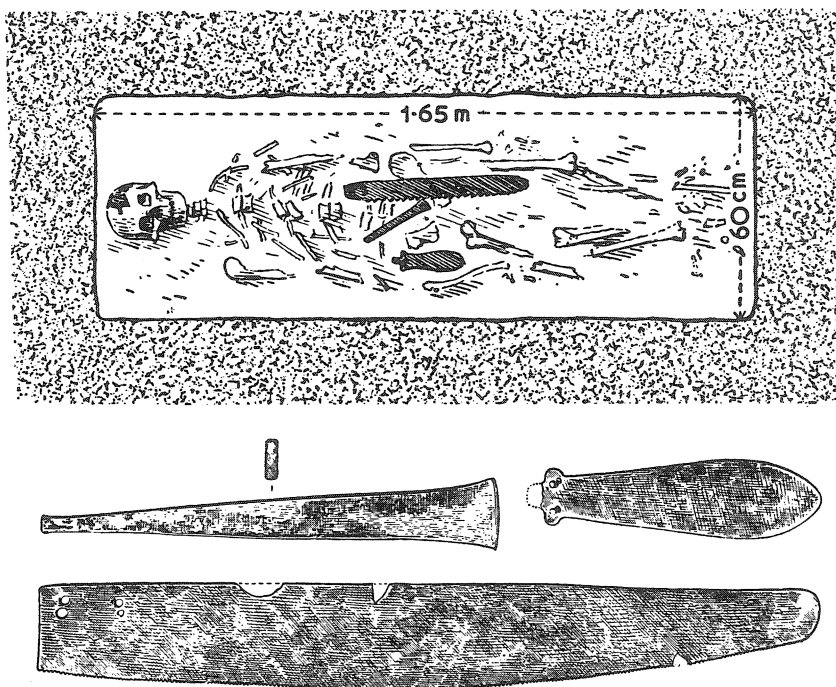


FIG. 17.1 Craft specialisation: the Carpenter's Tomb in the Late Minoan cemetery at Zapher Papoura. Length of saw 48 cm (after Evans).

workmen's flats in the Late Minoan Ia period'. There was a smith's forge, a carpenter's shop, an oil factory for pressing olives, and clay discs were found from potters' wheels. These finds help to fill out the picture provided by the great palaces of the late bronze age. The essential point here, however, is that they carry forward a trend already clearly indicated, although by regrettably few instances, in the third millennium.

Smithies of early bronze age date have been found both at Raphina and Chalandriani in Syros; the tool kit from Chalandriani (fig. 17.2) was described in chapter 16. The find at Myrtos (Phournou Koriphi) of what may be an Early Minoan II potter's workshop indicates that by this time specialised pottery manufacture was organised at the least on a village basis (Warren 1969a).

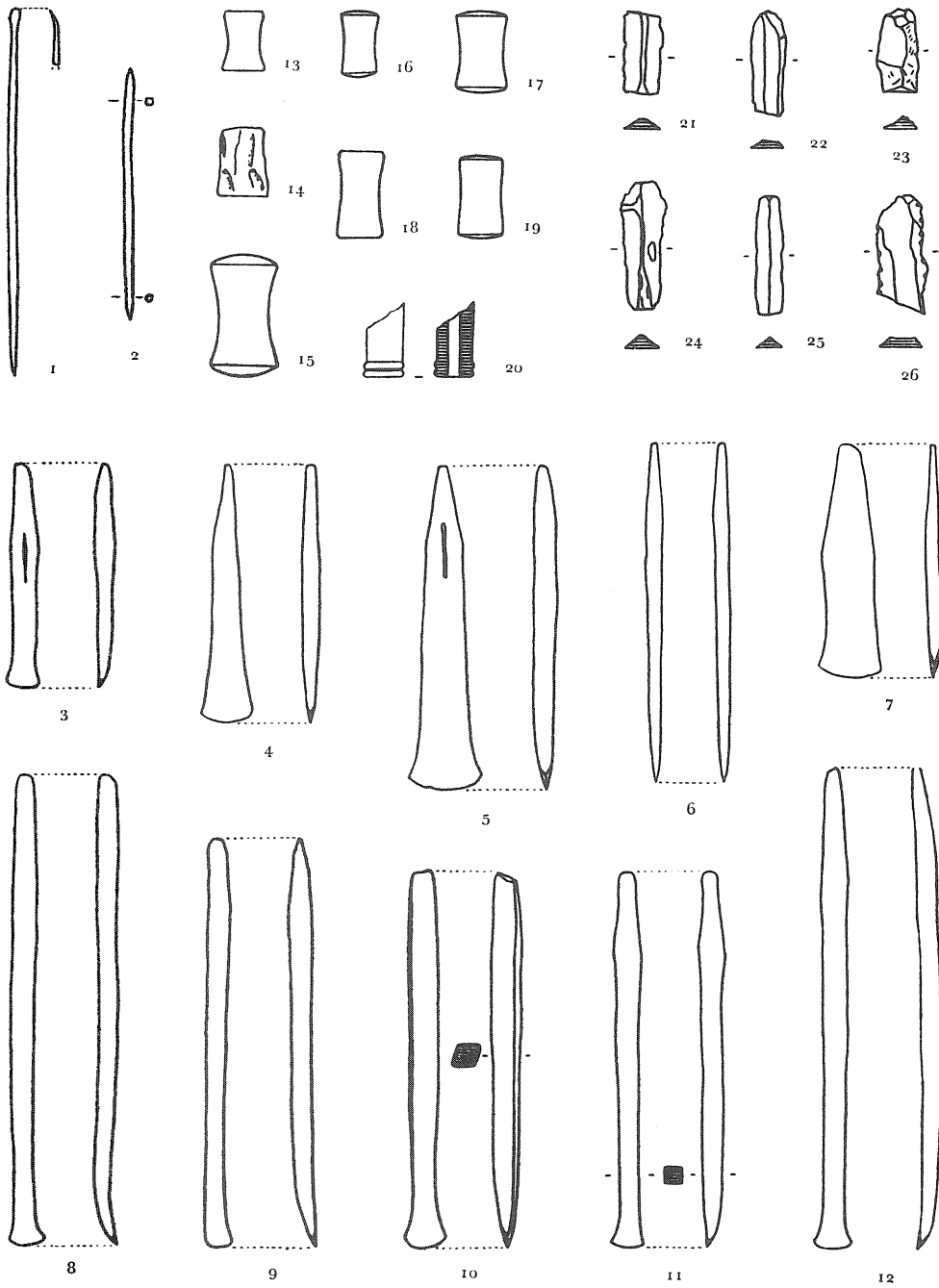


FIG. 17.2 The Chalandriani hoard, an early bronze age tool kit (after Bossert). Scale 1:2.

That specialist potters travelled from village to village, just as do the pithos makers in Crete today (Hampe and Winter 1962) is indicated by an exciting discovery at Lerna. A clay hearth of the Korakou culture had a band on its broad rim, decorated, as is often the case, by means of an incised cylinder which was rolled upon the clay while it was wet. The decoration showing a hound and its quarry (pl. 23, 1a; Caskey 1959, pl. 42, c–e; cf. Wiencke 1970) is identical to that seen on a pithos fragment found at Tiryns (pl. 23, 1b; Müller 1938, pl. xix, 2) and to a similar fragment from Zygouries (pl. 23, 1c; Blegen 1928, 121, fig. 114.6). The same cylinder was used in each case. Since the Lerna hearth was undoubtedly decorated *in situ*, and the transportation of a pithos from Lerna to Tiryns or to Zygouries seems overwhelmingly improbable, the cylinder itself must have travelled. The only logical implication is that all three objects were made by the same travelling craftsman.

Here then, is one way in which the small settlements of early bronze age Greece could support a number of specialists, and enjoy the excellence of workmanship which this makes possible. It seems likely that many of the specialist activities documented were supported in this way, although so elegant a demonstration is naturally lacking.

The products of skilled sculptors are widely distributed in the Cyclades in the form of the folded-arm figurine of marble. Some of these are of monumental proportions. These figurines can be classified into varieties (cf. chapters 11 and 19), whose members show a striking resemblance one to the other (pl. 30, 1 and 2, 3 and 4). Mrs Patricia Preziosi has recently suggested that some of these groups comprised the products of a single sculptor or his workshop. This ingenious suggestion would imply either a travelling sculptor, making works on the spot on commission (like the sculptors of classical times), or a trade from island to island of the figurines themselves. In either case specialist production is documented.

In general it was not a convention to bury tools with the dead during the Aegean early bronze age. Warriors and chiefs are better evidenced, as in the Amorgos graves, and those of Levkas, for weapons are frequently found. Grave 26A at Levkas (Dörpfeld 1927, pl. 80), which contained forty-eight arrows (or spear tips?) may none the less be that of a hunter. Two graves in Naxos contained what do seem to be craftsman's tools. Grave 23 at Aila, possibly of middle bronze age date, contained a saw, a crescentic two-edged knife, and two narrow chisels, which must be viewed as the tool kit of a deceased carpenter or leather worker (Papathanasopoulos 1961–62, pl. 62). Grave 38 at Apollona hints even at a family craft tradition (*ibid.*, pl. 77). The grave was a double one, with upper and lower parts, a custom which in other cases has plausibly been interpreted as indicating successive interments in a family grave. The lower grave contained a marble vase, palette and rubber, as was conventional, together with a knife, and, very exceptionally, a narrow chisel. The upper grave contained three flat axes, which, like the chisel, were doubtless used for wood working. One possible interpretation is that the two successive graves contained father and son, both carpenters.

Craft specialisation was indeed emerging during the early bronze age, as the roll seal used at Lerna, Tiryns and Zygouries most effectively documents. The consequence as

well as the cause of this specialisation (as always the growth depends on a positive feedback cycle of this kind) was the creation of a considerable new range of products.

The Changing Material Environment

In the discussion of the nature of culture and of civilisation in the introductory chapters, brief reference was made to Malinowski's description of the basic needs of the human being and the cultural responses to them (1960, 91). Malinowski went on to discuss the 'derived needs' for social control, political organisation and so forth, some of which will be discussed in later chapters. Here the intention is simply to illustrate how the cultural responses of Aegean man to his needs were transformed during the third and early second millennium BC. Man created for himself a new physical environment which responded in a new way to many of these basic needs. The needs to be considered here are subsistence, shelter, bodily comfort and health, safety, and transport. There is little which the archaeological record at present allows us to say about the growth of children or their training, the other point listed by Malinowski. The occasional finds of children's toys are the only obvious indications from the archaeological record. The basic need of reproduction, to which kinship is regarded by Malinowski as the cultural response, is sufficiently documented in the growth of population, discussed in chapter 14.

SUBSISTENCE

The subsistence subsystem was discussed in detail in chapter 15. Even in late bronze age society the bulk of the population were still farmers. This is, in itself, a specialisation (at least when viewed from the standpoint of man the hunter). But as the common lot of 'neolithic man' it is simply the background to the other craft developments of the time. The production of wine and oil, already discussed, may suggest the existence of the vintner and the oil-maker already in the early bronze age. On the other hand, oil and wine production involves chiefly seasonal tasks which may not have demanded the attention of full-time specialists.

A 'derived need', although none the less a material one, arising from the subsistence subsystem was for utensils, whether of pottery, basketry or stone. Their production became more sophisticated at this time.

The *potter* of neolithic times, as we have suggested, was already very accomplished. Kilns, such as that found at Olynthos, would have been very suitable for the firing of pottery. Two further technical advances occurred in the third millennium. One of them, the development of a figurative element in pottery design, seen at the end of the early bronze age, is a superficial one and is considered in chapter 19 with the development of art in general. The other, the development of the potter's wheel, was a considerable technological improvement.

At the beginning of the early bronze age the first step towards more effective production occurred in the Grotta-Pelos culture of the Cyclades. This was the use of an interior mould for cylindrical pyxides (Doumas 1969, 17). The pot and lid were apparently built up as a single unit about this mould, and were decorated with incisions while still in position around it. Then, as the pottery hardened, the lid was cut away from the body (probably by means of a cord) and removed, thus allowing the extraction of the mould.

The potter's wheel was an important innovation, allowing the throwing of pots and their more efficient production. The use of the fast wheel, set in motion by hand, and then spinning freely under its own momentum, was probably preceded by that of the turntable or slow wheel. This was likewise turned by the potter, but did not pivot so efficaciously as to continue rotating through its own angular momentum. The pot was still built by the potter upon it, rather than being thrown,

Probably the prototype technique for all these devices was that of building the pot up while resting on a mat. This would allow it to be turned freely to any position. Certainly mat impressions are found on the base of pots from the early neolithic period (Evans and Renfrew 1968, 71). Impressions of leaves are found on the base of bowls of the Keros-Syros culture. These bowls may well have been built up while resting upon such leaves although the impressions could have been formed when the pots were set on the left to dry after the vessel had been formed.

Xanthoudides (1918, 162) observing the parallel finger marks on the interior of chalices of the Early Minoan grey ware of Pyrgos type, concluded that some sort of turntable had been used in their manufacture. The striations do not run horizontally right round the vase, so that there is no suggestion that these pots were thrown on a fast wheel. Recently Warren has suggested that eight plano-convex clay discs found by him at the Early Minoan II settlement at Myrtos are turntables of this kind (1969a).

The fast wheel, a heavy disc often of clay, set upon a wooden wheel itself fixed to a free-turning vertical pivot, is first documented in the Aegean from Troy IIb, the Second City of Troy (Blegen et al. 1950, 255). The early evidence for its use comes from the clear parallel striations upon the pottery which run horizontally, forming horizontal circles. The same striations are seen on pottery from the first phase at Lefkandi in Euboia and then on pottery of the Tiryns culture at Lerna (Lerna IV). They are commonly seen on the Middle Helladic Minyan ware in mainland Greece and in the islands, and make their appearance in Crete during the Middle Minoan Ib period (Hood 1963).

Actual wheels of this kind, coming from several sites in Crete, were published by Xanthoudides (1927). He suggested indeed, that the smaller discs, of 20 to 25 cm in diameter, might have been used as the upper component of a foot-wheel. The larger ones (29 to 40 cm in diameter) were simple pivoted-disc wheels like the modern pivoted wheels which are used, simply as turntables, in the manufacture of large pithos jars (Xanthoudides 1918, fig. 13). There is nothing else, however, to indicate the existence of any more complicated fast wheel at this time, and probably the simple pivoted fast wheel was generally used.

Childe (1954b, 19) discussed in some detail the evolution and diffusion of the potter's wheel, and presented arguments for its invention in the Near East and for its subsequent spread from there. The earliest find of a fast wheel comes from the Uruk period at Ur, and certainly nothing in the Aegean is of comparable antiquity. The wheel-made pottery of Cilicia could indicate an intermediate step along the diffusion path, since Troy II and Tarsus were clearly in some kind of contact. Childe's diffusion theory can be supported in this way. But, on the other hand, the likelihood that a turntable was in use in the Aegean before the emergence of the fast wheel does open, as Warren has suggested, the possibility that the fast wheel developed independently in the Aegean. And whatever its origin, we see its gradual adoption in several regions of the Aegean. By the middle bronze age the fast wheel was known and used in all areas of the Aegean, and the technical means were then available for the commercial exploitation of pottery which is seen during the late bronze age.

The *manufacture of stone vases* became widespread during the third millennium. Already in the neolithic period stone vases were made, usually of marble, so that the idea is not a new one. A significant development was the use of the drill. It was first utilised to bore the shaft-holes of axes and maces, which were widely seen in the Aegean at the beginning of the third millennium. Indeed at Knossos it is attested very much earlier: stone mace heads are found already in Stratum VI datable to before 4000 BC (Evans 1964a, 156 and 231). It seems certain that the perforations were achieved with a drill, and perhaps a bow drill was already in use.

At about the same time in Bulgaria and Romania, the bow drill was used in the Gumelnitsa culture to produce shaft-hole axes of stone. Large numbers of them have been found, some in the unfinished state. The drill had been used with a tubular bit which ground away only the periphery of the shaft-hole, leaving a cylindrical core. Axes and mace-heads of stone drilled in this way are seen in the early bronze age levels at Sitagroi (phase V), and in early bronze age Thessaly, where Tsountas illustrated an unfinished example (1908, 324, fig. 251). Others with hour-glass sections indicate that the hole was drilled from both sides. At the same time, the battle-axe occurs in north Greece: the form is commonly seen at Sitagroi V and in Troy from the First City onwards. The form may well be of central European inspiration. Apparently the drill was not used for vase manufacture during the Early Bronze 1 period. The large *kandila* and the rhyton of marble in the Grotta-Pelos culture may have been made without the use of the drill, although this question has not yet been investigated.

During the succeeding Keros-Syros culture the shapes become much more elegant, and the drill may now have been used. For the first time stone containers are made of a green stone instead of the usual white marble, sometimes perhaps steatite but more frequently chlorite schist.

At about this time the production of stone vases began in Crete. The first products are in the Early Minoan II period, and are of the same green stone (Warren 1965, 8). In Warren's view they owe little to Egyptian inspiration and may be related to the

Cycladic examples. The tubular drill was not yet in use, but of course the elaborate decoration of some of these vases could hardly have been achieved without the use of metal tools.

Later in the Early Minoan II period a whole range of shapes is seen in Crete, utilising also a wide range of materials. The tubular drill does now come into widespread use, and emery, readily available in Naxos, was probably already utilised as an abrasive: its use has certainly been documented in the late bronze age (Warren 1967a, 52). Shell inlay is sometimes seen on the stone block vases of this period (Xanthoudides 1924, pl. x).

From this time onwards stone vases were intensively manufactured in Crete, in an increasing range of exotic materials. The most remarkable of these materials is the transparent and white-spotted obsidian obtained from the eastern Aegean island of Giali, which was much prized by the Minoans in the late bronze age (Renfrew, Cann and Dixon 1965, 239) and was already used in the Middle Minoan I period (Chapoutier and Demargne 1942, 54 and pl. LII, 26). Yet all of these vases were produced by the same technical means, to which may be added the compass, used especially in Mycenaean times (Warren 1967b, 52). As far as is known, the lathe (where the object is rotated, rather than the cutting instrument) was not used until classical times (Childe 1954b, 193; cf. Lucas 1962, 425).

SHELTER

The construction of buildings so sophisticated as the Minoan palace required the services of a range of craftsmen—architect, stonemason, carpenter and plasterer. During the third millennium BC the various skills as they had by then developed may still have been within the range of one man. But already the technical devices were becoming more complicated, so that by the late bronze age some of these occupations may have been separate crafts.

The *architect* was already able, in the early bronze age, to layout a building using units of measure. This topic is considered again in chapter 19.

The Cretan palaces stand at the end of an evolution which began in neolithic times. The use of mud brick by the *builder* at early neolithic Knossos has already been mentioned, and of course buildings and graves of rough stone in the early bronze age simply utilise neolithic skills. The house at Vasiliki, of *adobe* brick, bonded with wood, and the stone buildings of Chalandriani or Myrtos do not utilise new technical means, although stone tools may have been used in the very simple and approximate dressing of the rough-hewn masonry. Wall plaster, and plaster (or cement) flooring are seen for example at Sitagroi V as well as at a series of southern Aegean sites. On the other hand neatly dressed stone, cut into rectanguloid blocks with the aid of metal tools, was not widely used in building until the middle bronze age. The magnificent fortifications of middle bronze age Troy VI for example certainly exceed those of Troy I to V in grandeur and complexity (Blegen 1963, pl. 38–41). They present a totally different appearance to those

of preceding periods through this use of beautifully dressed blocks of stone, sitting together neatly and regularly.

The same regularity was seen in Cretan palaces, where limestone and especially gypsum blocks were carefully dressed in order to fit neatly and systematically together. There is nothing crudely 'Cyclopean' about their stonework. Graham has discussed Minoan masonry stressing the effective use which the Minoan builders made of veneers of alabaster, concealing a wall of rough construction (1962, 143 f., and 150 f.). Bronze saws up to 1.5 m in length must have been used to cut some of these great gypsum panels, and chisel strokes about 2 cm wide are seen. He quotes Pernier (*ibid.*, 154) who 'would even see the term "labyrinth" applied to the Palace of Minos, in the fact that the palaces were so to speak, the creation of the double axe (labrys), which first made possible the production of dressed stone masonry and so the appearance of monumental architecture in the Aegean'.

The extensive use of dressed stone distinguishes the Minoan palaces more clearly, perhaps, than any other feature from their Early Minoan predecessors. The bronze saws and chisels which became available only during the early bronze age were indispensable to this work. At the outset the hone and chisel may have been the principal metal tools: Pendlebury states that the saw was not used for masonry in the Middle Minoan I period (1939, 98).

The practice of building to a height of several stories, so well documented in the Town Mosaic at Knossos, and the use of columns and pillars, were important architectural advances. Among the further sophistications introduced in the palaces were a piped water supply (on the viaduct principle), an elaborate drainage system, and indoor toilets.

The third millennium builders in general used roughly dressed stone, sometimes set in clay used as mortar. Indeed the building techniques in themselves are not so impressive as the uses to which they were put. The House of the Tiles at Lerna, the Tiryns Rundbau, the fortifications at Chalandriani in Syros, the town of Poliochni and, above all, the whole proto-urban complex of Troy II, with its massive walls, each testifies to new concepts in construction and documents a new level of social organisation. Most of these are innovations in concept rather than in craftsmanship: the bastions at Chalandriani and Lerna, for example, are a new product of military technology rather than of building skill. It was in the early second millennium that the more sophisticated building skills, resting on the considerable achievements of the early bronze age, emerged.

The early Aegean *carpenter* is regrettably known to prehistorians chiefly through the tools which he used. Metallurgy had a major impact on the tool kit, although bone tools in general remained important for some functions, and chipped stone tools, chiefly of obsidian, were still utilised for several purposes. The axes and chisels of copper and bronze, found from this time onwards, were presumably used primarily for carpentry. The saw, discussed above, must have been an important innovation. Two finds from Naxos are revealing here, from graves in the cemeteries at Aïla and Ormos Apollona.

Both were discussed above in the section on craft specialisation, and do seem to imply the existence of carpenters.

The use of oil lamps for indoor lighting, another feature seen at the palaces, was discussed in chapter 15.

SECURITY

Personal security depended both on the collective defence of the community and the means available to the individual himself. The first of these issues is discussed in conjunction with warfare in general, in chapter 18. The impressive fortifications at several sites (although not in Crete) imply a high competence in architecture and masonry, as we have already seen.

The *armourer* was no doubt responsible in the late bronze age for offensive and defensive weapons, although his function overlapped with that of the smith. His concern went some way beyond the production of sword and dagger blades and of spearheads, however, although these were the essential basis of the Aegean armoury. He was concerned also with defensive armour. A splendid bronze helmet of late bronze age date has been preserved (Goldman 1931, 220), while helmets made of boars' tusks were found in the Shaft Graves at Mycenae, and are represented on the ivories of the time. Pierced boar's tusks were found in a middle bronze age context at Eutresis suggesting that the helmet was already worn in this period. No defensive armour of early bronze age date has been preserved, but coats and shields of hide may have been used.

The development of the bow is not very clear since the 'arrows' of the neolithic period may well have been leister prongs. As we have seen, a set of forty-eight arrows was found in the R graves at Levkas (Dörpfeld 1927, 80) and another nine arrows in a middle bronze age grave there. These perhaps give the earliest reliable evidence for the bow in the Aegean. Before this the sling stone may have been the principal projectile (Childe 1951b). The evidence for archery becomes very abundant in late bronze age times (Buchholz 1965): numerous little barbed arrows of obsidian are seen, and others of bronze. A bow is represented from Middle Minoan I Crete (Pendlebury 1939, 118) and large deposits of bronze arrow heads were found at Knossos together with Linear B tablets (Ventris and Chadwick 1956, 361). While the most important of these finds are of late bronze age date, it is clear that by middle bronze age times items of military equipment such as the helmet and the bow were being produced.

BODILY COMFORT

By the late bronze age of the Aegean the bath was a facility offered by every palace (fig. 21.3; cf. Blegen and Rawson 1966, figs. 422 and 423). Scrapers, like the Roman *strigil* might have been expected, and it is possible that some of the 'spatulae' in the Syros graves and in Crete (Tsountas 1899, pl. 10, 29–34; Branigan 1968a, 36) may have served this purpose. Certainly the tweezers so widely found in the graves (fig. 11.3) were toilet

articles. Perfumed oil was probably used, although it is directly documented only from the Linear B tablets (Palmer 1963, 269 f.). The considerable late bronze age export in stirrup jars (see chapter 20) may well reflect the trade in such perfumed oil.

That the *cosmetic arts* were practised in the Early Bronze 1 period is suggested by the red pigment which is found in many of the Early Cycladic graves. It was ground with a pestle on a little marble palette or in a marble bowl. Painted decoration is seen on the faces of some of the Plastiras-type figurines, and on the folded-arm figurines of the Keros-Syros culture (pl. 32, 1; Preziosi and Weinberg 1970). And little pots containing blue and white pigment have been found in the Cycladic graves (Papathanasopoulos 1961–62, pl. 66; Dumas 1969, 36–39 and 50). Such colouring materials, like the tweezers, are to be regarded as the personal cosmetic equipment of the dead person.

The production of clothing obviously became more complex at this time. Evidence for *leather working* is inevitably scarce, but the crescentic knife from the Aïla grave, discussed above, would be ideally suited to leather working (cf. Michell 1957, 70) as would some of the quadrangular awls found.

The whole craft of *textile production* was clearly transformed by late bronze age times from a local household concern to a commercially exploited industry. That large numbers of sheep at Knossos were reared for their wool has been persuasively argued from the Knossos Linear B tablets, although many of the details are uncertain (Killen 1964; cf. Young 1965). Probably a large part of the production was consigned to destinations outside of Crete, doubtless in the form of textiles. In the Egyptian tomb of Menkheperasonb Keftian envoys, generally now regarded as Cretans, are shown bearing folded cloths (Kantor 1947). Unfortunately little of this is reflected in the archaeological record by material finds. There are indications, however, of a change in spinning and weaving customs at the end of the neolithic.

A preliminary problem, however, is whether wool and flax were both in use. In the Mediterranean world nearly all of the rather few textiles identified are of linen: linen is found in the neolithic period in Egypt (Lucas 1962, 143), and flax may have been grown under irrigation in Iran by 5000 BC (Helbaek 1969, 416). It was grown as far north as Britain in neolithic times. Linseeds can, of course, be exploited for their oil, so that their discovery is not conclusive evidence of the use of flax. But textiles from the early Swiss lake villages were certainly of flax (Crowfoot 1954, 436). Only a single find of flax seeds has been reported from the Aegean, from the Korakou culture at Lerna (Hopf 1962, 4).

The earliest textile find in the Aegean is an impression on the base of a potsherd from middle neolithic Sitagroi (Sitagroi I). The impression of an exceedingly finely woven textile is seen at final neolithic Kephala in Kea. The carbonised textile fragment from Treasure M at Troy was reportedly 'cotton or linen cloth' (Schmidt 1902, 244; Schliemann 1880, 361). Cotton may safely be ruled out, but there remains at least a possibility that the cloth was of wool. A textile impression on an Early Cycladic dagger has been identified as linen (Zisis 1954, 587, note 2), but again the grounds for excluding wool were not made clear.

Although sheep were very widely distributed in neolithic times, there is remarkably little evidence for weaving with wool until the Danish bog finds of c. 1200 BC. Although the presence of woollen textiles at Çatal Hüyük has been suggested, the report of a detailed technical examination makes it seem far more likely that they were made of flax (Burnham 1965, 169; Ryder 1965, 175). Naturally it seems entirely acceptable that sheep were reared for wool in the Aegean late bronze age, but when this practice began is not clear. Ultimately a study of the animal bones from various sites may give a conclusive answer.

Spinning, needed for the preparation of yarn, whether of wool or flax, was clearly practised in Greece from the early neolithic period. Pierced pottery discs, which can

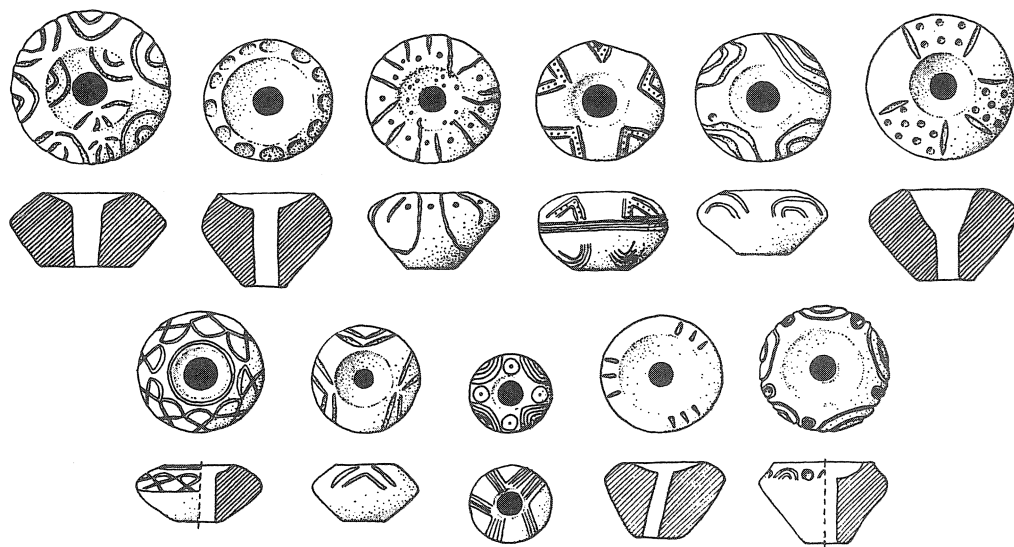


FIG. 17.3 Decorated spindle whorls from the Second City at Troy (after Blegen et al.). Scale c. 1 : 2.

reliably be accepted as spindle whorls, were found at Nea Nikomedeia and were very common at Saliagos around 4000 BC. Spindle whorls are hardly found at Sitagroi, however, until phase III, when a well-made conical form of terracotta is very common, often being decorated with incisions. In the early bronze age there this form was replaced by a heavier, more solid, biconical whorl, which was never decorated. A similar transition to biconical whorls occurs between the Blue and Red phases at Poliochni. Decorated spindle whorls are common at Troy (fig. 17.3).

At Knossos, spindle whorls are not found at all until Stratum IV, after 4000 BC (Evans 1964a, 233), which presents problems in interpretation. One distinct possibility is that fabrics of unspun fibre were at first produced, as in the Spanish neolithic, where tunics of esparto-grass were made in twined and plaited techniques akin to those of basketry

(Crowfoot 1954, 436). Unwoven (and unspun) felt can be produced from wool (Hodges 1964, 131).

Weaving no doubt began as early as spinning, although the earliest direct evidence for woven textiles in the Aegean comes from the impression on pottery at middle neolithic Sitagroi. Loom weights appear at Knossos at the same time as the first spindle whorls. They are either square in form, perforated at each of the four corners, or cowbell-shaped, of solid clay, with two holes at the top (Evans 1964a, pl. 56, 1 and 2).

At Sitagroi the earlier clay weights of phases I–IV are heavy cylinders of baked clay, up to 20 cm long; presumably they were used with some kind of loom. In period V pyramidal clay weights, of various sizes and with a single perforation, are found. These are precisely suited to act as warp weights for the kind of vertical loom which Crowfoot (1936–37) has shown to have been in early use in Greek lands. It is possible, although hypothetical, that these weights indicate the invention or adoption of such a loom in north Greece.

It is at Sitagroi, at just this time also, that clay anchors and clay hooks make their appearance. These objects appear very widely over the Aegean during the early bronze age, and in Italy a little later. They are clearly utilitarian objects, and their function was probably connected with weaving.

The rather inconclusive evidence thus indicates an increased interest in spinning and weaving early in the third millennium. Warren (1969a) has indeed suggested that his finds at Early Minoan II Myrtos may indicate that a considerable textile industry was practised there. Loom weights, evolved from those of neolithic Knossos, and spindle whorls are found and large numbers of pierced stones which may have been used as weights to anchor down the cloth laid out to dry. Many rubbers, grinders and quern stones were found and Warren suggests that they may have been used in the preparation of organic material for dyes. It is possible too that they were used in breaking up the flax stems to extract the fibres (cf. Neuburger 1930, 169).

Such specialisation at once leads on to the crafts of *fulling and dyeing*, which must certainly have been practised in late bronze age times and probably earlier. Fulling is the process of cleaning the textiles and removing the grease from wool, so as to allow the textile to cohere. The fabrics were put in classical times into large tubs and trodden with the feet in a solution of urine (Michell 1957, 183; Neuburger 1930, 175). Both Theophrastus and Pliny refer to the use of Kimolian earth and Melian earth (fuller's earth) from the Cycladic islands of Kimolos and Melos (*De Lapidibus* 62; Pliny *Nat. Hist.* xxxv, 183 and 196). It is possible that the spouted vats found at Myrtos (Warren 1969c, 5) and elsewhere in Crete were used in fulling, but the position of the spout close to the base, preventing any depth of liquid being contained in them, favours rather the suggestion in chapter 15 that they were used for pressing grapes.

A wide range of organic dyes was probably used, as in classical times (Michell 1957, 189; Neuburger 1930, 176). Purple, obtained from the marine mollusc *Murex*, is the only dye whose production is likely to leave any trace in the archaeological record. *Murex* was utilised as a food at neolithic Saliagos (Shackleton in Evans and Renfrew 1968, 133)

and its presence, even in abundance, need not point automatically to a dyeing industry. But very considerable quantities of *Murex* shells were found with Middle Minoan II pottery on the island of Kouphonisi near Palaikastro, and Herodotus (IV, 151) mentions Cretan dealers in purple in his own time. The Kouphonisi finds may well indicate a dyeing industry (Pendlebury 1939, 126).

Much of the evidence is inferential since the products of the craft, the textiles, have not been preserved. That there was a considerable trade in woollen textiles in the Aegean late bronze age seems likely enough. In early neolithic times, at least, flax was probably the principal fibre used. When the transition came we cannot be sure, but it may well have been at the end of the neolithic period when there is, for the first time, plausible evidence for the warp-weighted loom. If these conclusions are sound, we must imagine a textile industry growing up in the same way as metallurgy, with the excellence of the new products creating a demand and an increase in production, which in turn led to technical innovations and further improved products. This standard positive feedback growth pattern will have operated in the same way for many developing crafts.

TRANSPORT

In neolithic times land transport was exclusively on foot—there were no pack animals. The obsidian trade from Melos (chapter 20) documents that already well before 6000 BC sea-travel was possible. The distance travelled was, however, small, and the boats probably not suited to the open sea. They did not venture beyond the Aegean. By the late bronze age all this had changed: there were ox-carts, and chariots drawn by horses. Sea-going ships travelled regularly to Egypt and the Levant to the east, and to Sicily to the west. Indeed the Mycenaean had available to them the same means of transport as did the Classical Greeks. The decisive technological steps were taken during the third millennium.

Pack animals are not documented until the early bronze age. The best osteological evidence comes from Lerna, where no equine bones whatever were found in the neolithic levels. Several bones of the ass were found in Lerna III, the Korakou culture, and in subsequent levels, and what was probably a horse bone in the middle bronze age (Gejvall 1969, 36–37). In Gejvall's opinion this places the introduction of the ass and the horse to the Peloponnese in the early and middle bronze age respectively. A similar pattern emerges from Troy: a single equine bone, possibly of the ass, was found in Troy IV (Gejvall 1937–38, 54), and the horse makes its appearance in the middle bronze age in Troy VI. In Macedonia the horse is first reported in the early bronze age (Heurtley 1939, 88), but no equine remains were found in the neolithic or early bronze age levels at Sitagroi. Perhaps the ass was used as a pack animal already in the early bronze age, but the first direct evidence we have comes from a Late Minoan figurine (fig. 17.4) graphically documenting its use.

The horse is first seen in representation, drawing a chariot, on a stele from the Shaft Graves at Mycenae (fig. 18.7). Before the introduction of the chariot man had to travel

on foot, or sometimes by litter, a model of which was found in Late Minoan levels at Knossos (Hutchinson 1962, 117, fig. 17b).

Although the *chariot maker* cannot have been known in the Aegean until the time of the Shaft Graves, when representations of two-wheeled chariots are first seen, the *wheelwright* may have existed earlier. At any rate the cart is indicated in Middle Minoan I times by the model from Palaikastro (Bosanquet and Dawkins 1923, 17; fig. 17.5). Its solid wheels were conceivably single pieces of wood, but in this case heavy timber would have been needed: it is more likely that they were tripartite wheels, like those of the Near East and central Europe. Piggott has stressed the complexity of the manufacture of such wheels, and the need for chisels and gouges (1968, 268 and 305), and of course precisely these tool types are available in the Aegean from the early bronze age. This is the earliest evidence for the wheel in the Aegean, for the supposed wheel model from Gremnos in Thessaly (Milojčić 1956) is unconvincing. Earlier finds are known in the Balkans, and it is quite possible that a knowledge of the requisite skills, as well as of the pairing of oxen,

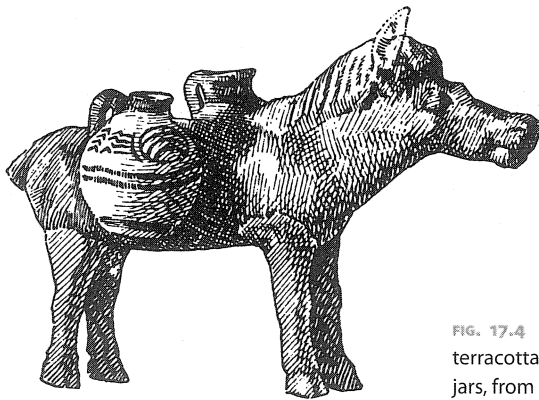


FIG. 17.4 The first pack animal in Greece: terracotta figure of an ass carrying water jars, from Late Minoan Phaistos (after Evans).

was learnt from the north. In Crete the potter's wheel and the wheeled vehicle are first seen at about the same time: in the Balkans the latter is markedly the earlier.

The spoked wheel is first seen on the war-chariot (fig. 18.7) around 1600 BC. The chariot was probably introduced to mainland Greece from the Near East (Hutchinson 1962, 118). Neither the wagon nor the chariot were of economic significance, nor were they an important aid to communication. The geography of Greece is such that, until the past century, travel has always been essentially by sea. Only on the flat plains of Thessaly and Macedonia is the wagon at present of daily use to the peasant. The chariot, while a splendid vehicle for prestige, and impressive in war, is not likely to have been very useful as a means of transport.

The craft of the *shipwright* was of far greater importance, although once again it may not have been the exclusive preserve of specialists. Homer gives a graphic description of Odysseus building his own boat on the island of Calypso (*Odyssey* v, 243 f.), and no doubt these skills were very widely understood. No direct evidence is preserved for

neolithic shipping, but many of the boats may have been dug-outs, of the sort which the Mochlos model appears to represent (pl. 28, 5).

The important innovation of the third millennium was the longship. Its construction required adequate timber, which we must assume was locally available, and the bronze tools of the carpenter, the axe and the auger. Bronze bolts may also have been used. Pitch obtained from wood, as well as resin and beeswax, may have been used for caulking the seams as in Classical times. Representations of these longships are seen on the Cycladic 'frying pans' of the Keros-Syros culture (fig. 17.6), the earliest picture of sea-going ships in Europe, perhaps in the world. They were powered with oars and did not have sails.

A considerable controversy has arisen as to which end of these representations was the bow. At first sight one would expect the fish mascot to face forwards, and Tsountas

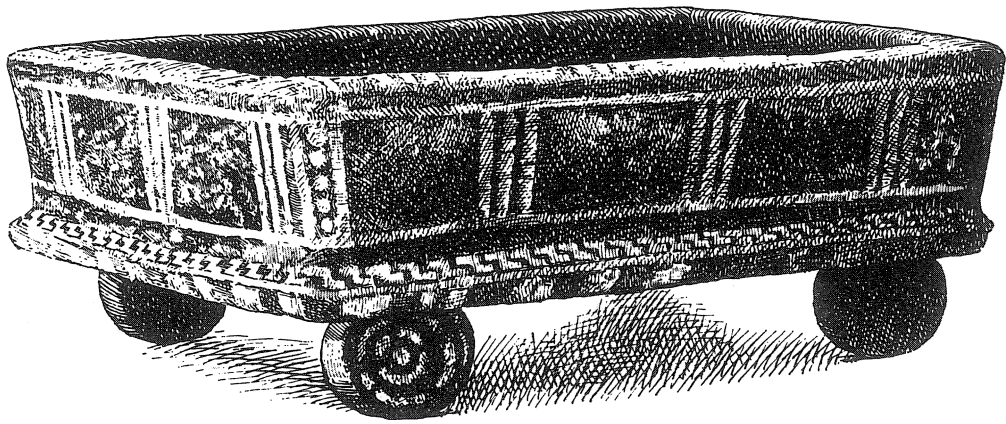


FIG. 17.5 Model of a painted wagon from the end of the third millennium (Middle Minoan Ia Palaikastro) (after Evans). Length c. 14 cm.

took the view therefore that the higher end was the prow. In this he was followed by Evans (1921–35, II, 240 and 438) who considered the projection at the lower end to be a fixed rudder. But a number of scholars have taken the opposite view (Edgar in Atkinson et al. 1904, 91; Marinatos 1933b, 182). They hold that the poop is the highest part of the ship, and the projection at the other end a sort of spur or ram which was common on Greek and Phoenician vessels, and apparently already seen in Melos in Mycenaean times (Marinatos 1933b, fig. 10.)

In support of the latter view is the high stern, identified through the steering oar, on a sherd from Phylakopi I (pl. 28, 1). The curved line of the stern suggests, however, that this may be a different kind of craft altogether.

New evidence has come to light to support the clear re-statement of the high prow theory given by Hutchinson (1962, 92). Three model boats of lead in the Ashmolean Museum in Oxford, apparently from a cist grave of the Keros-Syros culture, were found

with two folded-arm figurines (fig. 17.7; pl. 28, 3 and 4; Renfrew 1967a, 5). They clearly represent the same craft as are seen on the 'frying pans': the form is now admirably documented. It is clear that in this instance at least the higher end is the bow, and the more gently angled stern portion corresponds closely to that seen on the frying pans. That this type of ship was in use also on the coasts of the mainland is shown by an incised sherd from Orchomenos (Kunze 1934, pl. xxxix, 3)—the apparent masts are probably unrelated incisions. The model from Palaikastro in Crete (pl. 28, 6) may represent a craft of similar form.

It seems that the sail was a slightly later innovation: the mast is first seen on a Middle Minoan seal where the shape of the vessel is much the same (Marinatos 1933b, 191). This too is the craft seen on a painted sherd from Phylakopi (pl. 28, 2), possibly from the

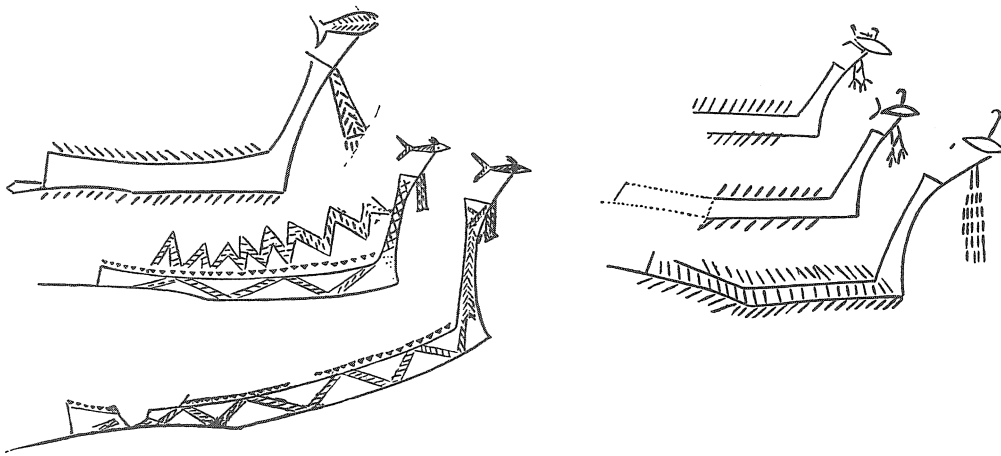


FIG. 17.6 Representations of Early Cycladic longships, incised on 'frying pans' of the Keros-Syros culture from Syros (after Tsountas). Scale c. 1 : 3.

First City. Hutchinson sees in the adoption of the sail in the Aegean the influence of the 'Byblos ship' (1962, 93) and to similar influence may be due the introduction of the curved prow and poop which became dominant in Middle Minoan times (cf. pl. 28, 1).

The ship with which we are dealing is therefore not a sailing ship. Its size could be judged approximately if we knew the number of oars, by use of the *interscalmum*, the distance from oar to oar in Classical times, now estimated at 5 ft. Marinatos (1933b, 191) has concluded that because as many as 26 oars are sometimes shown on the frying pans, their representation there is purely a token one. But there are several more careful renderings with a dozen oars on each side, and it seems reasonable therefore to think in terms of a vessel approaching 20 m in length (or rather less if paddles were used).

This craft is far more easily handled than a sailing ship; until recently there were pirate ships in the Aegean, all of this type. Marinatos (1963, 162) has pointed out that

'at definite periods of the year navigation in definite directions is not very difficult, and open-sea sailing is less dangerous than coastal; small vessels are preferable to larger ones since one can take to the oars and find a quick refuge in an anchorage at times when a larger ship, governed only by wind, would perish.' This was the ship responsible for the great increase in trade and communication in the Aegean during the early bronze age. Very possibly too the Levant and Egypt were first reached in such ships, before the mast and sail were adopted in the middle bronze age.

The construction of the sea-going longship very significantly enlarged the environment of the Aegean seafarer. Communications between the different regions of the

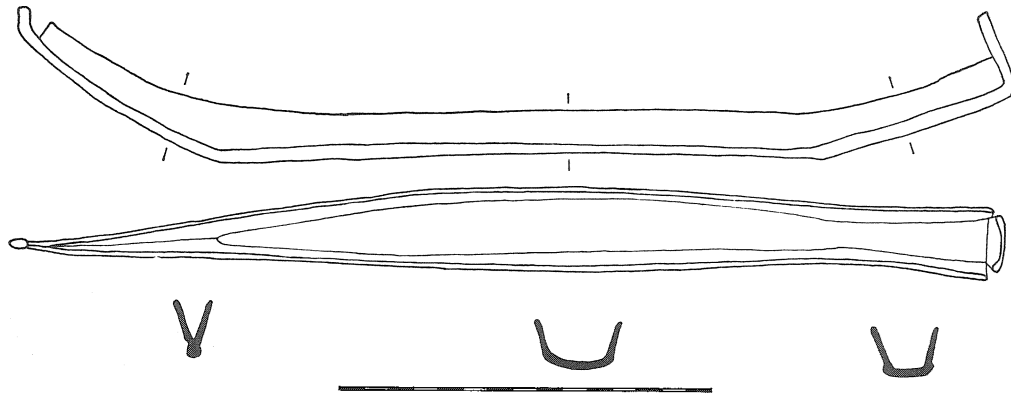


FIG. 17.7 Model in lead of an Early Cycladic longship, from Naxos. Scale in cm.

Aegean were facilitated: the east Mediterranean was now within reach. The material resources and indeed the skills of these lands became accessible, part of the effective environment; the possibility of trade gave this enlarged environment considerable economic significance. Piracy and the sea-raid clearly became frequent in the third millennium as the fortified coastal settlements show—here was another component of the human environment for which the shipwright was indirectly responsible.

CRAFTS FOR OTHER SYSTEMS

Three important crafts do not fall into the categories already discussed, because they do not, even indirectly, fulfil primary needs of man. The sculptor, the faience-maker, and the gem carver are making beautiful objects (which does not, of course, distinguish them from some of the craftsmen already discussed). The use of these products is, however, for social or religious rather than purely material ends.

The *sculptor*, like many of his colleagues, profited from the new range of tools. Some of the massive figurines of the Cyclades greatly exceed in size any that are known from previous periods in the Aegean, while the little musicians (pl. 27) achieve a new level of sophistication and complexity. They are sculptures truly extending into three dimensions, active, and with projecting limbs, not merely the compact rounded masses of the

neolithic. Metal tools will have been helpful here, and it was suggested in chapter 16 that the hoard found at Chalandriani on Syros (fig. 17.2; Bossert 1967, fig. 1) might, with its series of neat chisels and its stone rubbers, have been a sculptor's tool kit.

The drill was not used in the preparation of the majority of the figurines, but a few versions of the Plastiras type (Majewski 1935, pls. xx and xxiii) have drilled eyes, which were originally inlaid, possibly with obsidian.

The *gem cutter* or *lapidary* was another important craftsman in later bronze age times, when seal stones were enormously popular. Already in early neolithic times, stone 'seals' or 'pintaderas' are seen in Greece (Theochares 1959b, 64, fig. 28), and their clay counterparts are also found (Rodden 1965, 86; Tsountas 1908, 341). Both groups are related to, and possibly derived from, the similar 'seals' of Çatal Hüyük (Mellaart 1964b, figs. 40 and 41).

Seals in stone, metal and clay are found during the early bronze age over much of the Aegean. A square stamp seal from the Kouphonisia, for example, may be of this period (Dümmler 1886, pl. 1, 1), and the cylinder seal from Amorgos (pl. 23, 2; Renfrew 1967a, pl. 4, 19) most certainly is. On one end it has the angle-filled cross design so commonly seen in the Cyclades and beyond (cf. Bossert 1960), while on the cylindrical face there are incised lines and holes which may have been produced with the aid of a drill. The same grave contained a piece of bone or ivory showing concentric circles produced by a tube drill (Renfrew 1967a, pl. 4, 25). Bone decorated with similar drilled circles is seen from the Troy II period in the eastern Aegean (Blegen 1963, pl. 26), and this decoration, which later declines in popularity, is probably a reflection of enthusiasm for this new technique.

In mainland Greece, stone seals are attested from Asine and Raphina (Frödin and Persson 1938, fig. 172, 1; Theochares 1953, 112; Blegen 1928, 189 and pl. xvi, 4) and a similar seal of terracotta is from Zygouries. The Lerna sealings (fig. 7.7), of course, impressively document their use. In the eastern Aegean there are metal stamp seals from Thermi and Poliochni, and several in clay from the latter site (Lamb 1936a, fig. 50, 1; Brea 1964, pl. CLXX, 4 and also pl. CLXVIII).

It was in Crete, however, that the sealstone became widely popular. Just a few seals can be reliably set in the Early Minoan II period (Kenna 1960, 14; Warren 1968, 26; Warren 1970), and in the following centuries a wide variety of designs was cut upon seals of many different shapes. Indeed, while glyptic in the remainder of the Aegean did not, until much later, significantly advance beyond the position seen in the Early Bronze 2 period, the Early Minoan II seals are the first simple products in a long line of development. The drill was used already in the Early Minoan II period (Seager 1912, 109, fig. 54), and by Middle Minoan times a tubular bit was used. Later there are indications that a rotating cutting wheel was also employed (Kenna 1960, 76). An important departure was the introduction of figurative motifs, since the seals in other regions are decorated principally with geometric designs. Already in the Early Minoan II period, however, the Mochlos seals showed figured designs: in one case a human figure, in the other two monkeys (Seager 1912, 70, fig. 39; and fig. 11, II, 42).

A very high proportion of Early Minoan seals is in ivory (fig. 6.7), and perhaps because this material is so easily carved, the seals themselves are often given animal forms. Cows, lions, apes and birds are among the carved shapes (pl. 23, 4; Xanthoudides 1924, pls. IV, VIII and XIII) and from about this time human figures in ivory occur (*ibid.*, pl. VIII, 132), although not as seals. These figures stand at the beginning of a series of ivory carvings which culminate in the masterpieces of the Mycenaean period (Marinatos and Hirmer 1960, pls. 214–23).

The *glass-maker* and the *faience-maker* were, like the jeweller or the ivory engraver, producers of luxury goods.

The production of glass was well understood in late bronze age times. It was more common in the mainland than in Crete. Beads were very common (cf. Wace 1932, 206, 220 and pls. VIII–IX; Higgins 1961, 41), and some of them, generally blue in colour, were cast in steatite moulds. Such moulds have been found at Knossos and elsewhere. Small plates of glass were used at Mycenae to form part of a composite helmet, and the glass hilt plate of a sword was found on the Mycenaean acropolis. A bowl of glass was found at Kakovatos. Haevernick (1960, 41), in her useful study, has pointed out that both the techniques and the products of Mycenaean glass manufacture differ from those of Egypt. These techniques may have been learnt from the Near East, but it is perfectly possible that they were evolved locally. Schmid (in Haevernick 1960, 50) has conducted experiments to reconstruct the original techniques for the manufacture of the plate-beads, and concluded that they were cast in moulds at c. 1100° C. These temperatures had already been obtained by smiths (as discussed in chapter 16) and indeed the whole process of heating and casting in a mould is analogous to that required for the production of bronze objects.

Glass is not known with certainty from early bronze age contexts, but then, as Haevernick points out, archaeologists in general have not been very alert to the interest of glass finds. Schliemann (1880, 429, nos. 552–55) reported a glass bead and three small glass spheres from the Burnt City of Troy (Troy IIg). While we cannot be entirely confident of their stratigraphical position, the early bronze age context is supported by the find of an annular bead of blue-green 'paste' in levels of Troy IV by Blegen and his colleagues (1951, 215).

The possibility that glass was manufactured in the third millennium Aegean is made much stronger by the good evidence for faience. In the middle and late bronze age faience objects were made in a wide range of forms—not merely as beads, but as figurines, cylinder seals, inlay for gaming boards, 'sacral knots', as well as for the Town Mosaic, mentioned earlier. Some of these finds come already from the Middle Minoan Ia period (Evans 1921–35, I, 487). They were made locally.

Third millennium finds of faience include a bead from Macedonia (Heurtley 1939, 202, fig. 66, j), a faience bowl from Mochlos, beads from Early Minoan Koumasa (Seager 1912, 54 no. vi. 22; Xanthoudides 1924, 31), and beads from Treasures L and M at Troy (Schmidt 1902, nos. 6107 and 6121). Faience beads were also found at Alaca Hüyük in central Anatolia. Treasure M at Troy contained also the pommel for a dag-

ger (*ibid.*, no. 6124; Schliemann 1880, 428), the most elaborate of the third millennium finds in faience.

These various finds need not occasion surprise, since faience is known from a rather earlier date in Egypt (Lucas 1962, 156 f.). Recent work on the production methods of Egyptian faience show the process to have been simpler than was formerly realised (Noble 1969), involving only a single firing process (self-glazing). Analytical studies of British faience beads, which are probably contemporary with the Aegean middle bronze age, suggest that they were made locally in Britain, by techniques which may have been evolved there (Stone and Thomas 1956; Newton and Renfrew 1970). The manufacture of faience seems indeed a rather natural by-product of the pyrotechnic skills available to the third millennium smith. It demonstrates again how a development in one field can lead to advances in another, the production of bronze weapons perhaps being indirectly responsible for the manufacture of luxury objects of glass and of faience. This is yet a further case where a craft skill of the late bronze age Aegean may have had its origin in the third millennium BC.

These craftsmen, the faience-maker, the sculptor and the lapidary, open the way to a discussion of a number of other specialists, whose products are again not simply useful or materially productive. The scribe and the painter both needed a high degree of manual skill, and the priest and the chieftain themselves were masters of their own technologies. Politics today is classed by some as a 'science', and the special role of the chief was to govern and to lead. The priest (as discussed in chapter 19) supervised the workings, so costly in some civilisations, of the elaborate technology for the unknown.

These, however, constitute different subsystems of the culture system. Here the concern has been primarily with the craft production subsystem, of which metallurgical production forms a part. The growth of this subsystem transformed the physical environment of man. This is part, but only a part, of what we mean by the emergence of civilisation. The social and projective systems of society are likewise an integral part of the culture system. It is to these that we must now turn.

Chapter 18

Social Systems

XX

The changes in craft technology and production during the Aegean bronze age transformed the physical environment of man. He lived now, more than before, in a world of artefacts of his own making, which insulated him to a considerable extent from the world of nature, and protected him from its extremes of cold, of hunger and of fear which his palaeolithic ancestors must have suffered.

The environment of man is multi-dimensional, and in chapter 2 the significance of the social world, of the relationships of a man with other humans, was stressed. There are clear indications that this too was becoming more complex. Indeed, if the institutions and regularised customs of society be viewed as artefacts—and they are indeed products of man—they can be seen to fulfil functions broadly analogous to those of the material artefacts which mediate between man and the material world of nature. The social systems regularised and established patterns of conduct among men, bringing order to a man's social environment and offering protection against its potential dangers, lack of cooperation and hostilities.

The craft specialisation which was, as discussed in chapter 17, emerging during the third millennium was more widely significant than in the field of technology alone. It produced not merely a few new roles and occupations, but a whole new field of roles, and the very concept of occupation itself. Previously a man must have had a restricted variety of roles to play—in his family, as a member of a simple village society, and so forth. Now it became possible in addition for him to *be* a smith, or to *be* a potter, or to *be* a craftsman in stone. This was, literally, a new kind of *being*, to enjoy the status of a skilled craftsman and to be known, probably, by this role—just as is the modern doctor or village policeman. Previously, perhaps, a man had been known either by his position in a kinship system—as such-and-such a relation to a clan leader—or by the lands he occupied and tilled. To these primitive concepts of kinship and of territory a third was added: professional occupation.

Some aspects of the social order in the prehistoric Aegean are very difficult to reconstruct. The kinship system, for instance, has left little direct trace in the archaeological record, and can only be guessed at by comparing modern ethnographic parallels (com-

parisons sometimes misleadingly termed 'hypotheses') with such oblique indications as are available ('testing the hypotheses'). Other systems have left positive evidence and we can discuss the development of hierarchy, of wealth, of redistribution systems, of warfare, and of settlement size and function. First, however, it seems possible to indicate the general nature of Minoan-Mycenaean society and to suggest how it may be described in terms of anthropological theory—although admittedly this is but a single remove from the use of a specific parallel from ethnology.

Minoan-Mycenaean society can be viewed, in social terms, as composed of a number of large chiefdoms or principalities. This idea is put forward in the next section. The evidence bearing on the prehistoric Aegean social systems is then reviewed, and finally it is argued that during the third millennium we see both the completion of the evolution from tribe to chiefdom, and the beginning of that from chiefdom to principality.

Tribe, Chiefdom and Principality

Anthropologists frequently speak of three levels of social organisation in prehistoric times. Bands are conceived as assemblages of nuclear families, foragers for wild food, sometimes perhaps hunting together, often simply as family units, and integrated above the level of residence units only by individual kinship alliances (cf. Steward 1955, 122 f.; Service 1968, 7). The band level of integration must have been a characteristic form of social organisation during much of the palaeolithic era; it corresponds to what an earlier generation of anthropologists termed 'savagery' (Morgan 1871). Typical tribal societies are also often simple, fairly small, independent, self-contained and homogeneous, but they are usually considerably larger than bands (cf. Sahlins 1968). They normally include a number of fixed residence units or villages.

Tribal society is typically associated with food production, and the kinship segments or families are tied, much more firmly than in bands, by pan-tribal associations or sodalities, including some based on lineage and others which are not determined by kinship, such as age-grade associations, secret societies, or warrior fraternities. But the basic tribal structure is a weak one: there is no governmental organisation at tribal level and leadership is often confined in scope to the primary community, the village. This stage in social evolution was termed by Morgan 'barbarism', and it has plausibly been suggested that many neolithic cultures may be regarded as tribal societies.

The third major stage in social development, in the classification widely used by social anthropologists, is the state, a community of larger size, with agencies of government which, unlike those of the tribe, are explicit, complex and formal (Krader 1968). The organisation operates to secure the internal peace of society, to protect its external borders, and to pursue foreign relations with other states. This is the level of organisation generally equated with 'civilisation', and with which one might wish at first sight to link the Minoan and Mycenaean palace organisations and territories.

As we shall see, however, none of these terms is entirely appropriate to the civilisation of the late bronze age Aegean, which, while clearly organised on a basis more complex than the usual tribal level, lacked, none the less, some of the features of the developed state. A further model for the organisation of society seems illuminating here. It is in some ways intermediate between 'tribe' and 'state'—the chiefdom. Service has usefully re-defined the term chiefdom as a society distinguished from the tribal 'by the presence of centres which co-ordinate economic, social and religious activities.... Specialisation in production and redistribution of produce occurs sporadically and ephemerally in both bands and tribes. The great change in chiefdom level is that specialisation and redistribution are no longer merely adjunctive to a few particular endeavours but continuously characterise a large part of the activity of the society. Chiefdoms are *redistributational societies* with a permanent central agency of co-ordination. Thus the central agency comes to have not only a economic role—however basic this factor in the origin of this type of society—but also serves additional functions which are social, political and religious' (1962, 143 f.).

In his discussion of this term, Service stresses several features common to chiefdoms. The defining one, of course, is the office of chief, which implies the existence of specific functions and privileges, as well as a definite form of succession. These rules and sanctions relating to the state of chief may involve food, personal conduct and ritual activities, comprising both taboos and prescriptions. The most visible of these is generally a distinctiveness in dress and ornamentation. The succession is generally by primogeniture. The second social feature is a salient personal individual ranking: chiefdoms are hierarchical, with the higher members of the hierarchy generally related by kin to the chief and constituting a nobility. In this sense this is a class society, although without the existence of clear, separate, economically distinguished 'classes'. The society is, rather, graded internally like a feudal aristocratic class, but with no mass of peasants underneath. (This is a point to be considered again when deciding whether the Mycenaean society might not, after all, better be described as a state.) The sociopolitical ordering is created and perpetuated by a whole series of proscriptions, marriage customs and genealogical concepts, which can barely be discerned in the archaeological record, and which in turn influence social structure, status terminology and etiquette behaviour.

Chiefdoms show generally both an increase in the population density of the society as a whole, and often also an increase in the size of individual residential groups.

One of the most striking things about the evolution of culture is the rapid improvement in the products of craft specialisation at the point of the rise of chiefdoms (*ibid.*, 148). The specialised crafts are often subsidised at the redistributational centre, and this may result in the specialisation of a family line: the job becomes hereditary and the work increasingly skilled. The related aspect is the potential which chiefdoms offer for the development of public labour, and hence the accomplishment of works, such as irrigation or the terracing of slopes, or the erection of monuments such as temples or pyramids, generally beyond the scope of a tribal organisation.

Religion takes new forms, often with a priesthood which now occupies a permanent place in society. Supernatural beings come to include ancestors in genealogical rank-order, reflecting social order. Feuding within the society is much diminished, but warfare between societies was probably an important condition for the rise of chiefs, and the chief is also a military leader. Chiefdoms have borders or boundaries, and the 'rise and fall' of chiefdoms, often a result of conflict over territorial questions, is so frequent a phenomenon that it seems part of their nature.

This concept, although not necessarily everywhere applicable, is a useful adjunct to those of state and tribe. At once it is obvious that many of the most characteristic features of the chiefdom are seen in the Aegean for the first time during the early bronze age, and still more clearly in the palace civilisations. Armed with these *a priori* concepts (*a priori* insofar as the Aegean is concerned) we can now look at some of the salient features of the Aegean development.

NEOLITHIC VILLAGE SOCIETY IN GREECE

The archaeological record reveals only limited information about social organisation in Greece in neolithic times. Two archaeological units are recognisable: the settlement and the culture.

The settlement is a village, which in north Greece consists of separate houses, each presumably the home of a family unit. Nea Nikomedeia gives the clearest picture of the internal arrangement of such villages (Rodden 1962; 1965), although no complete plan is available from Greece. Romanian and Bulgarian settlements of the fourth millennium Gumelnitsa culture (fig. 5.1) suggest how such a village may have looked. There is little evidence for social differentiation—although a single large building was found at Nea Nikomedeia containing some splendid stone axes and figurines. It may have been a tribal meeting house or even the residence of some special personage.

These villages were set within a few kilometres of each other. No area of Greece has been exhaustively surveyed for prehistoric sites, but the Plain of Drama, at phase II of the Sitagroi sequence, gives some indications of the settlement pattern. Villages were sited in such a way that the best arable land was exploited. At this time situations were preferred which offered easy access to a range of environments, so that a favourite location was on the edge of good arable land.

The modern archaeologist tends, perhaps unconsciously, to compare the social structure of such villages with the social pattern of villages in the same area today, whose economy was, until the introduction of tobacco, cotton and maize, rather similar in its essentials. He may at first think of them as peasant communities, without any evident tribal structure serving to relate one village to another. But this is, of course, to ignore that peasants today belong to states, are linked economically (through marketing) to the state organisation, and participate in a state religion (Wolf 1966, 2). As Redfield (1947) has clearly shown, the folk culture of peasants presupposes the existence of a 'higher' civic culture, so that we must consider seriously whether these seemingly independent,

autonomous villages were not in fact closely related, unlike the peasant villages in the same area today, by close social links of a tribal nature.

The archaeologist recognises that adjacent villages share the same culture—use the same artefact assemblages, decorate their pots in the same way. Distribution maps can be plotted of artefact types, and ‘cultural borders’ drawn and culture areas defined on this basis. It is, of course, tempting to equate these with tribal areas. But culture distributions are constructs of the archaeologist, and can be plotted in very different ways to obtain entirely different results. Moreover, ethnographic parallels show that while a given tribe will usually have a fairly standard tool-kit for each of its various functions, the same artefact assemblages may be shared by other tribes also (Clarke 1968, 365 ff.). The territory of a single tribe is thus not likely to be larger than the distribution of an archaeological culture, but it may be very much smaller.

The recognition of tribes in prehistoric Aegean society, and *a fortiori* the definition of tribal areas, is thus very much the imposition of an *a priori* anthropological model upon the material. Steward (1955, 44 and 53) has stigmatised the term ‘tribal society’ as an ‘ill-defined catchall’, and in dealing with neolithic Greece we must remember that the modern tribal societies of the world are 6,000 years more recent than those of which we are speaking, and new social forms may have developed during this period. A hint of this perhaps given by the apparent absence of weapons of war in the Aegean neolithic—we find only a few slingstones—for local warfare and skirmishing is today a common feature of many tribal societies. But there may, of course, have been other weapons of wood.

The archaeological unit ‘culture’ cannot be translated automatically into tribal terms: it is necessary to consider first what such an equation implies. The basic archaeological reality is the village farming settlement. These may have been linked to form segmentary tribes but, until we have positive evidence for pan-tribal sodalities, the suggestion is somewhat speculative. The artefacts and especially the ceramic decoration may yet hold information bearing on inter-village social links, but much more work has to be undertaken on the nature of these links. Their assumption seems a plausible way of explaining the homogeneity seen within a given culture, but it is supported by little concrete evidence. Their elucidation remains a task for the future.

THE MINOAN-MYCENAEAN PRINCIPALITIES

The archaeological remains of the late bronze age give much more evidence of a social nature than do those of neolithic times.

First there are the palaces, obviously the homes of rich and powerful rulers whom one might well term ‘kings’. But any modern term carries with it overtones (here for instance of succession by a primogeniture in the male line). The meaning of the social terms used in the Linear B tablets can be established only by their context, which is not unequivocal, so that here these rulers will for convenience be termed ‘princes’ and their domains ‘principalities’ in the hope that these terms have less precise connota-

tions than king and kingdom. We shall return below to the nature of these principalities.

Secondly we see throughout southern Greece in the late bronze age a fairly uniform culture (as defined by the artefacts) which covers the territories of several palace centres. There is a distinct but equally uniform culture in Crete in the Late Minoan I and II periods. Only in the Late Minoan III period is it more similar to that of Mycenae, so that some writers speak of a Mycenaean *koine* throughout the southern Aegean. Many, however, would still distinguish sharply between the culture of Crete and of the mainland (Hooker 1969, 65).

A first question which we should consider in assessing late bronze age social organisation is whether there was ever a Minoan or Mycenaean 'empire' of the kind associated with some of the civilisations of the Near East. Few archaeologists would now hold that Crete ever held political control over mainland Greece: the Theseus legend is more suggestive in its story of the destruction of Knossos than in the tributary status of Athens with respect to Crete. Although the Mycenaean influence in Crete in the Late Minoan III period is so strong that some writers talk of a Mycenaean dynasty at Knossos, there is no indication of any actual political control from the mainland: the Knossos tablets have not been interpreted in this sense. If there was a Mycenaean conquest of Knossos, this may be seen as part of the normal 'rise and fall of chiefdoms', one of the 'cyclical conquests' of which Steward writes (1955, 196), and the ruler of Crete was not merely the agent of a mainland king.

It does, however, seem entirely possible that some of the islands were controlled, first by Cretan and then by Mycenaean chiefdom-states. Although the importance of the 'thalassocracy of Minos' may have been exaggerated (Starr 1955; cf. Buck 1962), there were certainly settlements on a number of islands, including Kythera, Thera, Kea, Melos and Rhodes, which imported large quantities of Minoan pottery in Late Minoan I times. These are the so-called 'colonies', and at most of them Minoan influence was followed by Mycenaean in the Late Helladic III period. Yet while Minoan influence on the islands was at its height, there were several flourishing palace centres in Crete, and it has not been shown that Knossos controlled the island politically at this time. Crete itself was probably not a single political unit. It remains doubtful whether the island 'colonies' were ever under any effective political control from Crete or mainland Greece.

In discussing territorial questions of the kind raised by the term 'empire', the geography of the Aegean is a dominant factor, as historians and geographers have realised (Myres 1953; Semple 1932). In classical times the Aegean saw the emergence of the city-state: tiny geographical units (the islands of Amorgos and Kea both supported three) which possessed none the less many of the defining features of states. The small size of the classical Greek city-state is well brought out by Plato's ideal formulation whereby the state's land should be divided into 5,040 allotments, to be owned by family heads, who were citizens (*Laws* v, 738A). This would suggest a total citizen population of 20,000, and an overall population (including slaves) of perhaps only 40,000

for the entire state. The difficulties of land transport in southern Greece, and the size of the islands made inevitable the kind of regional division which we see clearly in Mycenaean times also. It was not until the fifth century BC that Athens and Sparta, and later Macedonia, expanded their effective political control to form nation states or empires, so that we need not feel the absence of such an empire in earlier times surprising.

Nor does the existence of a fairly uniform Mycenaean culture in mainland Greece necessarily indicate a single Mycenaean state. Perhaps unconsciously following Homer (who must not, of course, be taken unquestioningly as a guide to Mycenaean social structure) we tend to think of a regional breakdown into principalities—Agamemnon ruling at Mycenae, Menelaus at Sparta, Nestor at Pylos, Odysseus at Ithaca, and so forth. These Homeric indications do seem to conform broadly to the archaeological pattern of the palace centres. A similar pattern may be imagined for Crete, with its large and possibly autonomous centres at Knossos, Phaistos, Mallia and so on.

If the effective political unit was the minor state or principality, it is difficult to grasp the underlying social structure which sustained the Mycenaean *koine* throughout southern mainland Greece, and later in some of the islands as well. If we follow Homer, its distribution corresponds to that of the Achaeans, who spoke the Greek language and thought of themselves as different from other people. They were linked by ties of kinship and friendship. They exchanged gifts, and in time of war could act together. And yet collectively they had no real organised structure of leadership. We may indeed speak of pan-Achaean sodalities linking the principalities, which were the basic organisational units, and operating between the princes who were their rulers. Thus the analogy for the Achaean-Mycenaean *koine* is the anthropologist's concept of the tribe, whose residence units (or sub-tribes?) correspond to the principalities. There was certainly no single Achaean state, in the anthropologist's sense, if we follow Homer.

Returning now to the Minoan and Mycenaean principalities themselves, it is clear from the Linear B tablets that they had an economic organisation which rivalled in complexity that of the Near Eastern states. Finley, one of the few to have considered the Minoan texts in social terms against the instructive background of other early societies rather than exclusively from a close reading and philological interpretation of the tablets, has drawn this conclusion. For him the tablets 'help free "Asiatic society" from its traditional links both with the "Orient" and the inundated river valleys' (1957, 144). The tablets give a clear picture of effective economic organisation, with their rations and especially their work quotas. And if the view be accepted that the Pylos tablets contain detailed logistic arrangements for territorial defence (Palmer 1963, 103 and 147) they also document some very impressive military organisation. There was nothing *ad hoc* about Mycenaean administration.

In other respects, however, the analogy with the state is less sure. The Minoan or Mycenaean prince did not preside over social or religious institutions so sophisticated as those of Hammurabi of Babylon or the Egyptian pharaoh. Minoan-Mycenaean society lacked, indeed, many of the features common to these early states. There are no

great public or civic monuments, such as the statues of the pharaohs or the stelai of the Sumerians, and no great ceremonial centres like the acropoleis of the Greek city states or the pyramids and ziggurats of the early kingdoms. The citadels and palaces, and the tombs of their occupants, are the only great monuments of Minoan-Mycenaean civilisation.

Nor is it yet clear to what extent there was in Minoan-Mycenaean society a well-defined class structure, although the Linear B tablets are felt by some scholars to document slavery.

Efficient political control is one of the criteria for the state: 'the presence of that special form of control, the consistent threat of force by a body of persons legitimately constituted to use it' (Service 1962, 171). The state constitutes itself legally, making explicit the manner and circumstances of its use of force, and forbidding other use of force, by lawfully interfering in disputes between individuals. Yet if we were to follow Homer, we should certainly deny to the Mycenaeans any effective form of overall state organisation. The assemblies which the Achaean leaders loved to call together did not apparently have very well-defined powers, although in a sense they were a limitation upon the individual power of the principal Greek leaders. Nor was the established assembly in Ithaca, which met in a prescribed place, an effective executive body. Odysseus had, upon his return, to fight to put his own house in order. On the other hand the efficiency of the Mycenaean palace economy suggests that Homer's view of Mycenaean society is not a reliable one in this respect, and perhaps it should be discounted.

The small territorial size, absence of a clearly defined class structure and the suggestive lack of monumental religious or public buildings could indeed lead us to deny these principalities the status of state. Indeed Service's concept of chiefdom would in some respects be an appropriate one to describe the late bronze age society of the Aegean. With their craft specialisation, their redistributive system, and their developed but not yet highly institutionalised religion (see chapter 19) there is an obvious analogy. But to draw this analogy is to overlook the significance of the palace as an *institution*. The economic organisation was institutionalised, and the *tholos* tombs and palace throne suggest that so too was the leadership. We shall see below that the term chiefdom can more conveniently be applied to the early bronze age Aegean.

In the last analysis these autonomous principalities did not differ in size from the Greek city-states, although as Finley rightly stresses they were societies of a very different nature (1957, 140). And with their palaces, technical accomplishments and writing they oblige us to regard the culture of the time as civilisation. Something more than chiefdoms, something less than states, their designation is not particularly important so long as their essential nature is clear, and so long as the terms used do not carry with them misleading overtones from other societies.

The palace principalities can thus be regarded as minor states, effectively organised economically, but in other respects not differing so strikingly from chiefdoms. At the same time they were linked to each other by affinities of culture and language, and by

ties which probably did not amount to political organisation. These ties, as we have seen, are rather like tribal ties, and may indeed be the perpetuation of tribal links seen during the neolithic period between the different settlement units of a culture. There need be no contradiction here in seeing tribal links co-existing with an organisation at the level of minor states, since the anthropologist's evolutionary scheme, from band to tribe and so to chiefdom and state, is no more than a construct. Taking the view that the Minoan-Mycenaean social organisation in the late bronze age was one of minor states or principalities, linked by ties resembling those operating within tribes, we can now proceed to consider the early stages of its development.

The Emergence of Wealth and Hierarchy

There are many kinds of hierarchy, but the most significant is that of power, the quality which ensures that one's wishes are followed. The pecking order of statuses in the power hierarchy is often simply a chain of command. But in many societies wealth brings power, or power brings wealth, so that the power hierarchy and the wealth hierarchy correlate closely.

Archaeological finds rarely give direct evidence of power, unless it is symbolised by a prince's throne, as at Knossos (fig. 18.5), or by the princely sceptre imbued with a special meaning, such as we imagine for the Mallia find (fig. 18.6). They often yield information about wealth, however; grave goods are especially informative, and much of our information comes from this source. Ucko (1969, 266) has rightly indicated that wealth in grave goods does not necessarily correlate with wealth in life. Yet in the prehistoric Aegean the increasing richness, and the widening disparity between rich and poor, are certainly of note.

Wealth is not defined by the usefulness of goods owned so much as by their desirability. Gold, for instance, is less useful for most purely practical purposes than bronze or even lead, and a gold bar would be of small advantage in the world if no-one else coveted it. But gold is widely esteemed as precious, partly no doubt for its attractive appearance, partly for its rarity, and chiefly in accordance with a convenient social convention. The value of goods, and hence wealth, is indeed largely a matter of convention whereby a society covets one commodity rather than another. The feather decorations of the Aztecs, for instance, were prized by them more highly than gold yet were considered of little worth by the Conquistadores. Wealth, the ownership of desirable transferable goods, is as much a social phenomenon as an economic one.

THE NEOLITHIC PERIOD

In early neolithic times the scope for wealth was limited. Probably there was little that was enviable in owning more corn than one could eat, if others had enough, or more land than one could till. Livestock, of course, was a very real form of wealth, but the

range of desirable artefacts was limited: stone axes, perhaps, and rare materials like obsidian. *Spondylus* and other shells may have been valued in communities lying at some distance from the sea. But in the Greek neolithic there is little evidence for any special value set upon particular kinds of stone axe, for example, such as we imagine for the jade axes of Britain or the battle-axes of early bronze age Troy. Very few burials are known from the neolithic Aegean, and until the Kephala cemetery the grave goods were so scanty, if there were any, that they can scarcely have been envied by the living.

The absence of grave goods is, in the first instance, a burial custom and need not lead us to doubt that stone bowls, for instance, or well-made figurines, or attractive beads and decorations of stone or shell, were indeed prized by their owners. But the finds are few, and do not indicate any special concentration in the hands of individuals.

In the third millennium the situation changes. As we shall see below, the whole new range of artefacts then available offered, perhaps for the first time, the possibility that one man could be conspicuously more wealthy than another. And the burials, especially in the Cycladic cemeteries, indicate that considerable disparity was emerging in the goods owned by individuals.

THE CYCLADIC CEMETERIES

Already at Kephala in final neolithic times the position has changed: for the first time a complete marble vessel is included in a grave. And the grave goods do now show some variation between individuals.

TABLE 18.1 Disparities in the wealth of grave goods in the Pyrgos cemetery of the Grotta-Pelos culture. (Note: several beads or shells are counted, in the final column, as a single object supplemented by a +.)

Type Grave	Jar 5	Pottery Pyxis incised 9	Pottery Pyxis plain 10	Pottery Pyxis (spherical) 11	Marble palette 17	Marble kandila 18	Marble bowl 20	Marble figurine 22	Beads 24	Stone rubber 25	Shell 32	Other pottery -	Bird beads 23	Total Types	Total Objects
82		1												1	1
84				1										1	1
88									8			1		2	2+
90									2					1	1+
91	1											1		1	1
93		1							3					2	2+
96	1	1												2	2
98		1		1			1			2				4	5
100			1	1	1			2						4	5
101		2												1	2
102									8					1	1+
103	1							14	5		34			4	17+
104						1								1	1
105		1							7				2	3	3+

With the Grotta-Pelos culture in the Cyclades the disparities in the grave goods becomes very marked, although the actual range of types is limited. (The tendency of the Cycladic grave-good forms to fall into distinct types, and their range and variety, was discussed in chapter 9.) There are relatively few forms in which disparities can be expressed, but the variation which does occur is shown in Table 18.1. It sets out the grave goods which Tsountas (1898) found in fourteen of the richest tombs at the cemetery of Pyrgos in Paros. In all he excavated 58 cist graves in this cemetery, all rectangular in shape and made of schist or marble slabs, each originally containing a single burial. He reported the contents of the fourteen graves listed here, and it can safely be assumed that most of the remaining forty-four graves either had no grave goods, or only a single object.

We see then that the majority of graves have no goods, or a single vessel. With these may be contrasted Grave 103, which contained:

- 1 Incised pottery jar (cf. Tsountas 1898, pl. 9, 1 and 4)
- 14 Schematic marble figurines (ibid., pl. 11: 4, 6, 7, 10 and 13)
- 5 Beads
- 34 Shells.

This grave thus contained four distinct types, and more than seventeen objects. The other rich grave, Grave 100, contained:

- 1 Cylindrical pottery pyxis (ibid., pl. 9, 14)
- 1 Spherical pottery pyxis with incised decoration (cf. ibid., pl. 9, 34)
- 1 Stone, possibly a headrest
- 2 Marble figurines (ibid., pl. 11, 14 and 17).

This grave thus contained five objects of four different types. A similar impression is gained from the Panaghia cemetery, where Tsountas reported in detail ten graves of the twenty-three he excavated. Eight of these graves contained two different types of object, for instance a pottery vessel and a few blades of obsidian, and fourteen contained either a single type of object, or no grave goods at all. Only one grave (Grave 56) had a notably richer inventory:

- 7 Pieces of obsidian (including three cores) (Tsountas 1898, pl. 8, 10 and 15)
- 2 Marble palettes (ibid., pl. 10, 11 and 15)
- 1 Stone, possibly a headrest (ibid., fig. 6)
- 1 Marble bowl
- 1 Bowl of other stone (ibid., pl. 10)
- 4 Beads of stone (ibid., pl. 8, 57–59)
- 1 Stone rubber
- 1 Shell
- 4 Pieces of copper wire.

This grave thus contained more than ten objects of seven different types. Clearly then some of the graves contained rather richer goods than the average: others were entirely

without goods. And while it does not follow that the goods buried with a man after death hold a very close relationship to those which he possessed in life, some correlation seems plausible in the present case. A similar impression is gained by the graves in Naxos excavated by Stephanos (Papathanasopoulos 1961–62) although unfortunately of more than five hundred opened, we have details of only fourteen.

The graves already discussed, of the Grotta-Pelos culture, are to be set in the Early Bronze 1 period. The Kampos group, discussed in chapter 10 and Appendix 2, falls at the end of this period. Apart from the Kampos (Aghios Nikolaos) finds, it is represented by the Louros grave, which contained Grotta-Pelos ceramic forms as well as a 'frying pan' of Kampos type, and some metal objects. It is, by the standards of the time, exceptionally rich and contained:

- 2 Undecorated pottery spherical pyxides (Papathanasopoulos 1961–2, pl. 67 a, d)
- 5 Miniature pottery jars decorated with spiral incisions (*ibid.*, pl. 66, lower)
- 1 'Frying pan' of Kampos type (*ibid.*, pl. 66, upper)
- 1 Marble bowl (*ibid.*, pl. 67, b)
- 1 Marble saucer (*ibid.*, pl. 69)
- 15 Pieces of obsidian (including one core) (*ibid.*, pl. 68)
- 1 Stone bead (*ibid.*, pl. 67, 2)
- 4 Shell beads (*ibid.*, pl. 67, e)
- 7 Marble figurines of Louros type (*ibid.*, pl. 70)
- 200 Silver beads forming a necklace (*ibid.*, pl. 67, c)
- 4 Copper quadrangular awls (*ibid.*, pl. 68, lower).

This remarkable grave thus contained more than twenty-five objects of no fewer than eleven different types, and is certainly the richest known of those dated to the Early Bronze 1 period.

During the succeeding Keros-Syros culture, the presence of metal objects automatically increases the variety range. And the disparities between rich graves and poor graves are consequently magnified.

Tsountas himself excavated four hundred and ninety graves at the great cemetery of Chalandriani in Syros, giving details of thirty-two of the richest. Their contents are tabulated in Appendix 2. He also listed the totals of certain classes of object found, and we may compare their occurrence in the total cemetery with their occurrence in the thirty-two specified rich graves.

If the assumption be made that Tsountas chose the samples simply by selecting those graves with the greatest number of objects, irrespective of the nature of the object (although in fact he seems deliberately to have favoured graves with painted pottery or marble figurines), then the following computation can be made. The frequencies of selected types among the richer graves are examined, and contrasted with the figures given by Tsountas for the cemetery as a whole.

These results are very interesting: they show that the rich graves are not simply distinguished by a large number of types or by a considerable quantity of objects. These

rich graves have an inordinate preponderance of certain types. If the grave goods were randomly distributed throughout the graves of the cemetery, we would expect a sample of thirty-two graves to contain approximately 7 per cent of the total objects of each type which are found in the cemetery. We see from Table 18.2 that for many classes of object they have a vastly greater proportion, with no less than two-thirds of all the occurrences of copper tweezers found in the entire cemetery. Even more remarkably they

TABLE 18.2 Analysis of contents of graves of the Chalandriani cemetery with particular reference to the 32 rich graves described by Tsountas. The selected types are listed in rank order of their concentration in these rich graves. (Tc indicates pottery; F.P. indicates 'frying pan'.)

Type no.	Type	Total cem. (490)		32 rich graves		% Rich graves containing type	% Other graves containing type	% of total of type contained in 32 rich graves
		No. of graves A	No. of objects B	No. of graves C	No. of objects D	$\frac{C}{32} \times 100$	$\frac{A-C}{458} \times 100$	$\frac{D}{B} \times 100$
30	Cu tweezers	11	15	7	10	21.8	0.87	66.6
51	Cu spatula	26	29	15	18	46.9	2.4	62.1
38	Tc F.P.	30	32	14	16	43.7	3.5	50.0
49	Bone toggle	30	35	10	14	31.2	4.4	40.0
52-53	Cu/Ag pin	14	18	4	7	12.5	2.2	38.9
35-37	Painted pot	24	26	8	8	25.0	3.5	30.8
13	Obsidian	50	(50+)	9	12	28.2	8.9	24.0
55	Cu needle	30	(30+)	4	7	12.5	5.7	23.3
39	Tc footed pot	(48-)	48	9	10	28.2	8.5	20.8
45	Tc bowl	224	(227+)	9	12	28.2	46.2	5.3
54	Tc cup	121	129	5	6	15.6	25.3	4.7

actually have *less* than a normal or average share of two specific types. Little pottery cups and small pottery bowls are actually less common amongst these rich graves than in the rest of the cemetery.

In other words, certain specific types tend to be *concentrated predominantly in the hands of the rich*. In terms of modern society this is quite unsurprising, but in prehistoric society it implies the emergence of an artefact assemblage associated with a select group of people. This is a property distinction not only of degree but of kind. And the particularly interesting counterpart is that the simple pottery cup with concave sides and the simple saucer or rounded bowl (types 45 and 54) were actually avoided by the rich. We see here, perhaps, the emergence of snobbery! There could be no clearer indication that the concept of wealth was consciously held at this time.

Setting aside the marble figurines and bird-headed pins, which were present only in small quantities, we may divide the types into four groups:

- (i) Types more than ten times more frequent in richer graves than in the others. These include copper spatulae, copper tweezers and 'frying pans'.
- (ii) Types five to ten times more frequent in richer graves: bone tubes, copper pins with decorated heads, painted pottery.
- (iii) Types two or three times more frequent in richer graves: obsidian, copper needles, footed pottery vessel.
- (iv) Types less common in richer graves than in poorer ones: pottery cup, pottery bowl.

As far as can be detected there is otherwise little strong correlation between the types and I have been able to detect no systematic association among the finds which could indicate a sexual distinction: we cannot assume that men did not use needles or take special care over their appearance. No weapons are found in the graves, nor indeed copper axes or chisels, although the settlement finds show that the inhabitants possessed them.

The almost aristocratic nature of some of the graves, contrasted with others, may be indicated by four examples, first the poorest pair and then the richest pair of the thirty-two graves which Tsountas records in detail: the vast majority of the graves, of course, were poorer than any of these.

'Grave 157. About ellipsoidal, diameter 1.0 m $\times$ 0.3 m. The body lying on its right side. By the skull a painted footed cup, and a pottery saucer of the usual kind.'

'Grave 415. About rectangular, width 0.6 m. On the left side of the grave a spherical pyxis and a schematic figurine of marble.'

'Grave 356. The body on its left side. By the head a footed vessel with stamped and incised decoration, a marble bowl and an obsidian blade. Behind the head a frying pan, a stone palette and a grinder. By the feet a marble bowl with traces of red colouring, a seashell, copper tweezers, a carved bone tube containing traces of blue colouring, a straight bone tube with a copper spatula beside it, a bone pin with bird head, two bone fragments perhaps from another pin, and two lumps of red colouring matter.'

'Grave 468. Quadrilateral, 1.4 m $\times$ 0.8 m. In the right upper corner a copper awl, a stone palette, a pebble rubber and a cup with a leaf impression upon the base. In the wall on the right side was a cavity measuring about 0.4 m $\times$ 0.2 m, in which was hidden a pottery-footed vessel with stamped and incised decoration, two seashells, three copper spatulae, a copper pin with double spiral head, a copper pin with complex knot head, three copper needles, two awls, six stone beads, a bone ring and fragments of another, pieces of a bone tube, ten worn shells and a schematic marble figurine.'

None of the graves of the Keros-Syros culture in Naxos had as many goods as this. But the rich Grave 10 of the Spedos cemetery, already mentioned in chapter 15, was extremely rich. Exceptionally too it contained two types of lamp, which are unique; normally the finds in graves—even in Syros—correspond closely to a defined repertoire of types. The finds were as follows: (fig. 15.7; Papathanasopoulos 1961–62, pls. A, B, and 46–50).

- 2 Marble folded-arm figurines
- 2 Marble bowls
- 1 Spouted marble bowl
- 1 Triple lamp of marble
- 1 Painted pottery triple lamp
- 1 Painted pottery 'sauceboat'
- 2 Painted pottery jugs
- 1 Footed and spouted pottery bowl
- 2 Large footed jars with incised decoration.

This grave documents eloquently the growing wealth of some members of the community.

Turning now to the Amorgos group of the Keros-Syros culture, which extends in time into the Early Bronze 3 period, the presence of weapons in the graves is noteworthy. They do not occur in the Syros graves, and rather rarely in Naxos. While the Syros goods indicated personal wealth of an almost aristocratic kind, some of the Amorgos finds are verging upon the princely in their nature. Three grave groups will be described.

Dokathismata Grave 14 (Tsountas 1898, 154)

- 2 Marble folded-arm figurines (pl. 30, 1 and 2)
- 1 Copper slotted spearhead
- 1 Midrib dagger with silver rivets
- 1 Pottery jar
- 1 Fragmentary clay bowl
- 2 Marble bowls
- 1 Fragment of a silver bowl.

Kapros Grave D (Renfrew 1967a, pls. 4 and 10)

- 1 Silver bowl (pl. 19, 5)
- 1 Needle of copper
- 2 Greenstone handles
- 1 Greenstone cylinder seal (pl. 23, 2)
- 22 Beads, including 3 of silver
- 1 Ivory fragment, with drilled circles
- 2 Shell figurines
- Marble figurines

Dokathismata Grave 14A (Tsountas 1898, 154–55)

- 1 Silver diadem (fig. 18.1, 2)
- 1 Silver pin with animal head (fig. 18.1, 4)
- 1 Silver bowl
- 2 Silver bracelets (fig. 18.1, 3)
- 1 Marble bowl
- 1 Pebble grinder with traces of red colouring
- 1 Lump of red colouring matter
- 1 Pottery jar with leaf impression on the base
- 1 Marble figurine (type not specified).

The finds in these graves, especially the last, are much more splendid in themselves than anything in the Syros graves. We see now vessels of precious metal, impressive

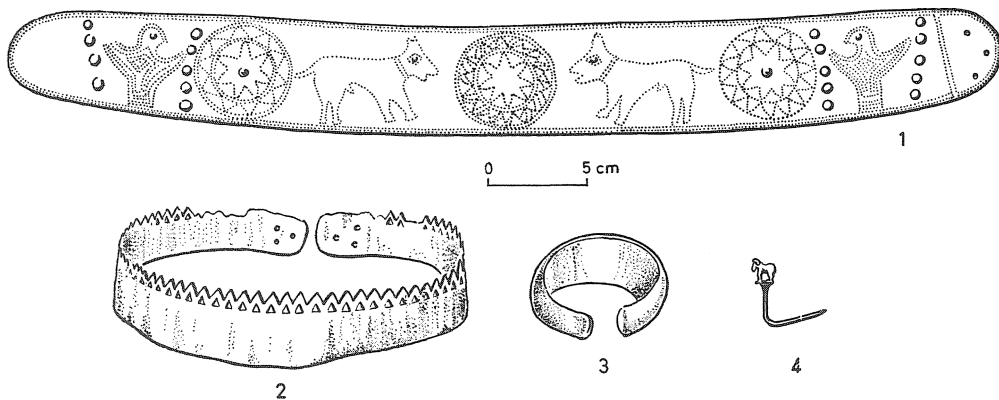


FIG. 18.1 Social status in the third millennium BC. Silver diadems and ornaments from the Cyclades. 1, from Chalandriani in Syros; 2 to 4 from grave 14A at Dokathismata in Amorgos.

weapons (with silver rivets) and, above all, personal adornments. The diadem and silver bracelets of Grave 14A at Dokathismata may well be emblems signifying a high status—perhaps that of a chief of some kind. They certainly would have conferred prestige in their own right. The same holds true, of course, for the diadem from the settlement at Chalandriani (fig. 18.1; Tsountas 1899, pl. 10, 1).

These finds give a clear picture of the emergence of a social stratification during the early bronze age—at the beginning marked by a slight variation in the quality and quantity of grave goods; by the end indicated not only by greater quantities of finds, some concentrated in the wealthy graves, but also by the avoidance of ‘common’ types and the rare inclusion of princely (or at least ‘chiefly’) objects.

One important consequence of these burials should not be overlooked: the considerable stimulus to the economy arising from the regular burial (and hence elimination) of

so many desirable goods. This resulted in a sustained demand for such objects, which might otherwise have been satisfied in part by the inheritance of heirlooms, and favoured a higher level of production than otherwise would have been necessary.

OTHER EARLY BRONZE AGE FINDS

Various other rich grave finds of this period have been made in the Aegean. The Cretan ones, although they testify to comparable wealth, are not susceptible to the same kind of analysis, since the burials were in general collective, and individual burial associations cannot be ascertained. Yet we may note the riches of Tomb II at Mochlos, where eighty-five gold ornaments were found accompanying only three seals and three dagger blades. The presence of secondary burials and the possibility of disturbance complicate the situation, and yet we can say that one or more of the individuals buried in Tomb II at Mochlos was very much richer in grave goods than the average occupant of the Mesara *tholoi* could possibly have been.

Again, in the earlier phases, the finds of Pyrgos and Kanli Kastelli, which are chiefly ceramic, document an emerging variety. Those of Platanos (Xanthoudides 1924), Lebena (Alexiou 1958), and especially Mochlos, with their rich and beautiful goldwork, hint at the same kind of stratification as is indicated by the silver of the Amorgos graves. There were several golden diadems amongst the goldwork of Tomb II at Mochlos (fig. 6.8; Seager 1912, 22), and the finds are assignable to the Early Minoan II period. Tomb XIX was almost as rich. In Crete, the beautiful and finely worked stone bowls were clearly an important part of the rich man's wealth.

The finds of the period in mainland Greece have not, in general, been so rich. There were some attractive finds at Zygouries, however, and the important cemetery at Steno on the Ionian island of Levkas yielded a number of rich graves whose associations are recorded. Two will be listed here, not only to document the considerable quality or range of goods which accompanied certain burials, but to stress the inherently costly character of some of them.

Grave R 1 (fig. 18.2; Dörpfeld 1927, pls. 60, 1 and 5; 61, b, 7; 62, 10; 63, c, 6; 64, 1-3; 67, a, 1)

- 1 Silver bracelet
- 1 Necklace of gold beads
- 1 Copper spatula
- 1 Spindle whorl
- 18 Obsidian blades
- 1 Pottery 'sauceboat'
- 1 Pottery bowl
- 1 Pottery footed cup
- 2 Pottery vessels
- 1 Large pithos.

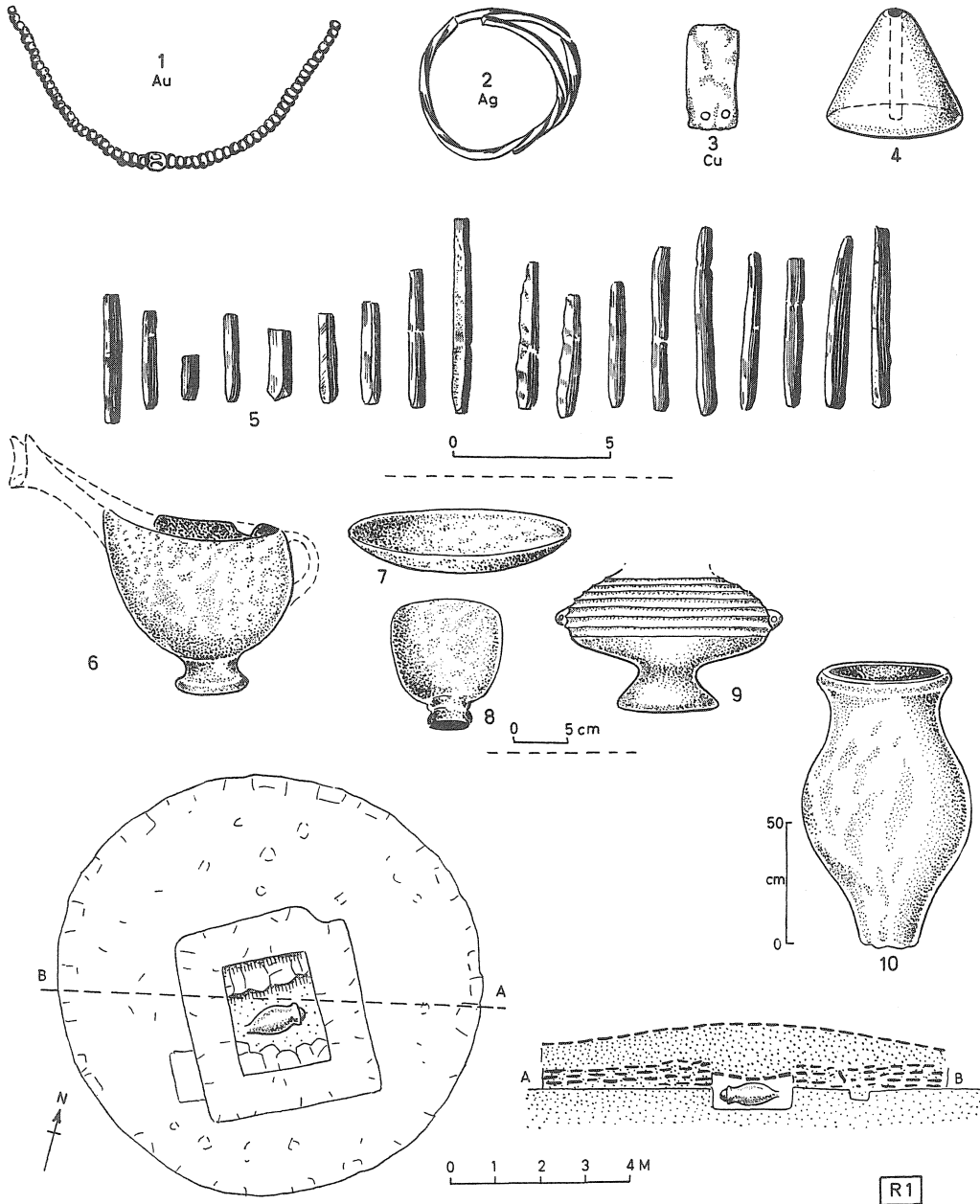


FIG. 18.2 Grave R1 of the third millennium cemetery at Steno in the Plain of Nidri on Levkas. Note the presence of gold, silver, copper (or bronze) and obsidian.

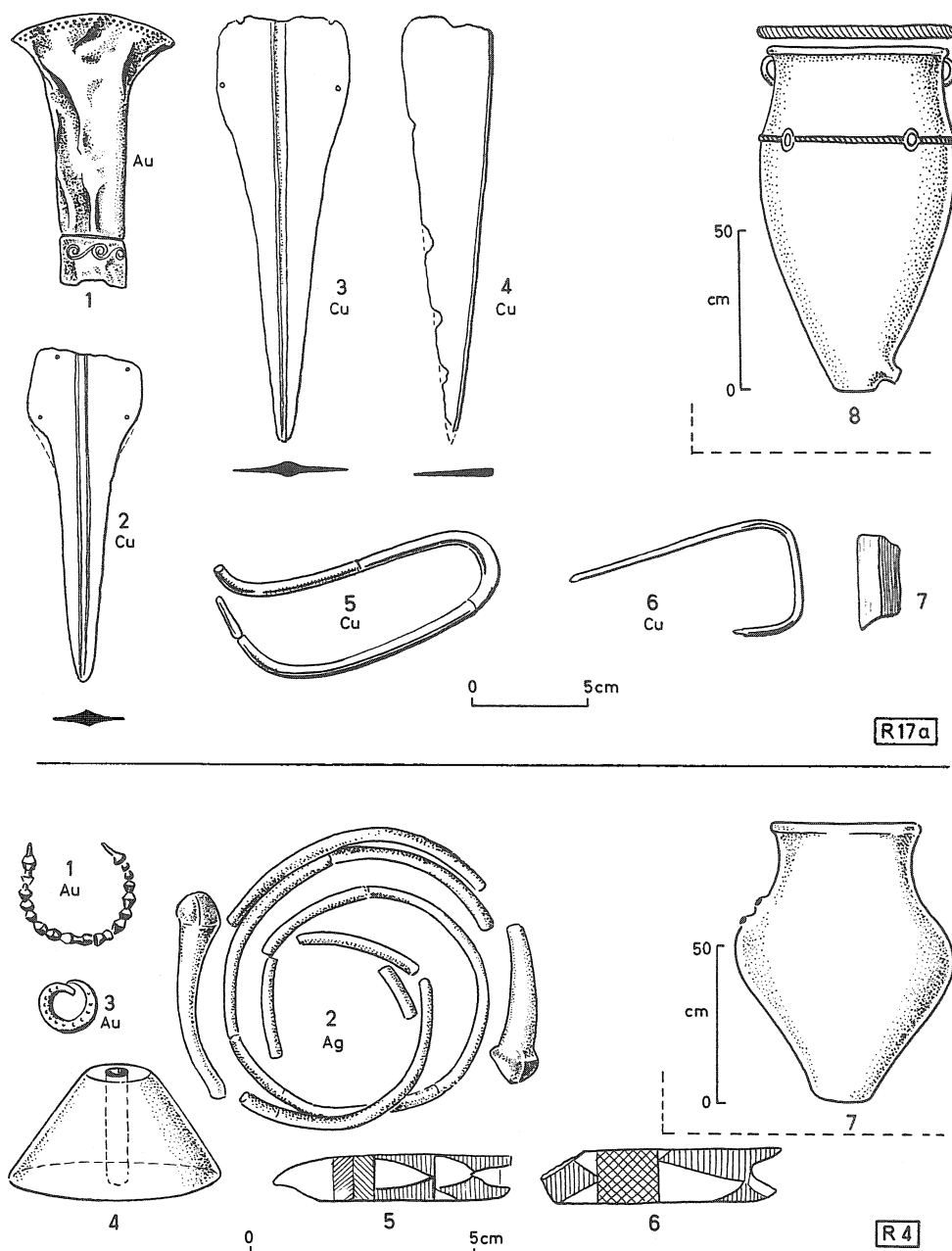


FIG. 18.3 Wealthy men and women. (*Above*) finds from what was probably the grave of a man (R 17a) at Steno in Levkas. Note the gold sheath for the dagger hilt, and the use for the burial of a spouted pithos of the kind used to store wine. (*Below*) finds from what may have been the grave of a woman, in the same cemetery. Note the gold and silver adornments, the bone tubes (possibly to contain cosmetics), and the terracotta spindle whorl.

Grave R17a (fig. 18.3; *ibid.*, pl. 61, a, 4 and b, 3 and 5; 63, a, 3–4 and 6–8; 67, b, 5)

- 2 Copper midrib daggers
- 2 Gold sheet coverings, for dagger hilts
- 1 Flint blade
- 2 Copper nails
- 1 Copper knife
- 1 Large pithos.

These may very well be regarded as chieftains' graves, the first (R 1) for a woman, the second (R 17a) for a man. The associations for the cemetery are predominantly of the Korakou culture, and the finds indicate that the same process of emerging stratification was taking place in western Greece as in the Aegean proper.

Finally, the richest early bronze age finds of all are, of course, the treasures of the eastern Aegean. The fine treasure of Vano 643 at Poliochni contained a magnificently rich series of personal adornments, more splendid than any found in the cemeteries of the time (Brea 1957, 206 f.). The chief prize was a golden dress pin decorated with two birds in antithetic arrangement (pl. 18, 5), with several elaborate pendant earrings, bracelet torcs of gold, golden buttons and four fine bead necklaces. This was the apparel of a personage of note, and indeed if the wealth is indicative of social stratification, of high rank.

These finds are surpassed only by the treasures of the Second City of Troy, discovered by Schliemann. Among the dozen or so 'treasures'—associated groups of rich material—two are of special note in addition to Treasure K, which was mentioned in chapter 16 and, although of metallurgical interest, is without precious finds.

Troy Treasure A was of astounding wealth (fig. 8.5; Schmidt 1902, 225)

- 19 Plate vessels comprising 3 of copper, 12 of silver, 1 of electrum and 3 of gold
- 3 Golden diadems (2 of them with elaborate pendants)
- 4 Elaborate golden earring pendants
- 51 Small golden earrings
- 4 Golden bracelets or earrings
- 26 Beads and oddments of gold
- 6 Silver bars (fig. 19.1)
- 19 Daggers and spearheads of copper and bronze (some fragmentary)
- 17 Flat axes of copper or bronze
- 4 Chisels of copper or bronze
- 1 Knife of copper or bronze.

Very notable here is the absence of objects other than of metal, and the presence of bronze tools and weapons together with the plate and jewellery. The fragmentary nature of some of the bronze objects reveals that this may not have been a personal or even collective deposit of valuables but rather plunder (or a hasty assemblage of valuables)

gathered together during the destruction of the city. It need not necessarily represent the possessions of a single person, but the magnificence of some of the objects make an even more impressive impact than the Poliochni treasure.

Treasure L from Troy is strikingly different in character. Its great glory is four magnificent battle axes of finely worked and attractively coloured stone (fig. 18.4). There were

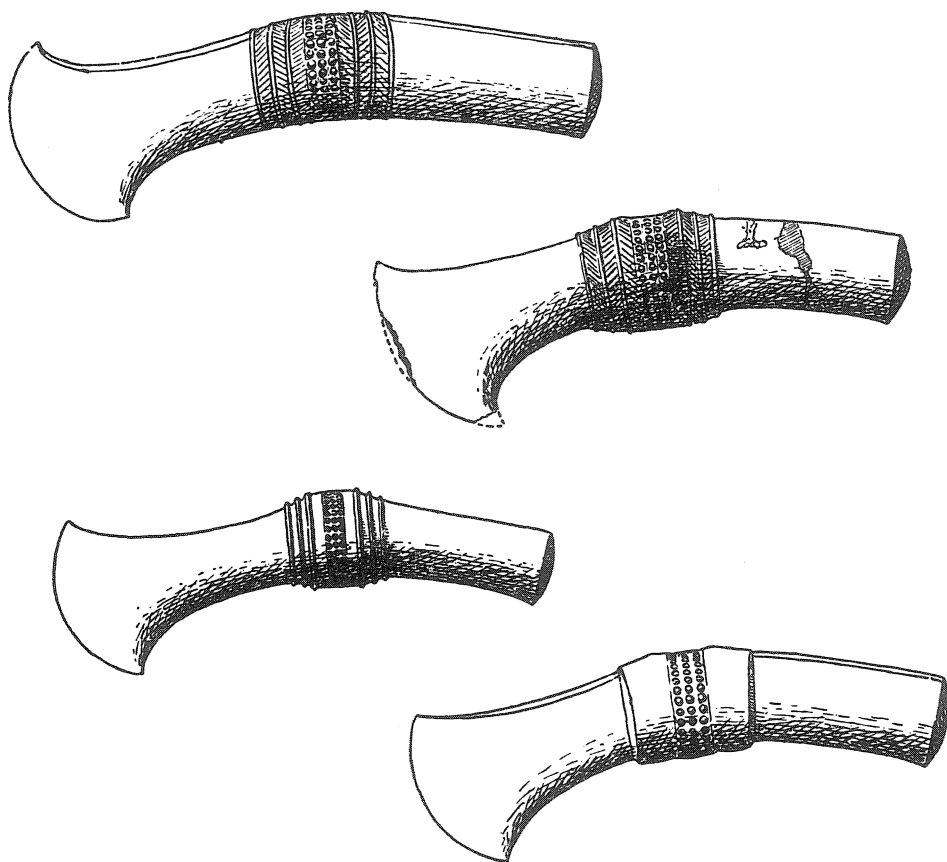


FIG. 18.4 Weapons of display, from *Treasure L* at Troy II. The battle-axes are of green or blue stone, of length c. 30 cm (after Schmidt).

also six knobs of rock crystal, possibly dagger pommels, and forty-five plano-convex pieces of rock crystal which may have decorated a metal girdle, four stone beads, a pommel (apparently of iron), and numerous small gold, silver and faience beads. (The presence of amber beads in this hoard is uncertain.)

The shaft-hole axes here must surely be taken as the emblems of a chieftain or prince: they are not objects simply for use. The various objects of crystal clearly ornamented weapons and apparel of a similarly symbolical nature.

Treasures M and O are also relevant, since, like A and L, each contains objects which are absent from the others. Treasure M contained quantities of carbonised cloth, and a faience object, possibly a handle. Treasure O (Schmidt 1902, 245) contained the two gold pins so conspicuously lacking from Treasure A. The remaining treasures (apart from K) simply duplicated the finds of Treasure A.

The function of the various buildings of Troy IIg has been discussed by Mellaart (1959a). Whether or not he is correct in thinking that a large proportion of the buildings were in the use of the central administration, it seems likely that several of the treasures (especially A, L, M and O) formed part of the wealth of the chief man of Troy. Taken together they yield a homogeneous impression of massive personal (or collective) wealth: plate, jewellery (diadems, earrings, necklaces, pins, bracelets, beads and crystal adornments), textiles, metal weapons, crystal and faience pommels, ceremonial shaft-hole axes, silver bars, and various metal tools.

There are only two or three diadems, two or three pairs of pendant earrings, and two or three dress pins, so that very few persons (whether male or female) could be decked out in all this finery. And the axes and accessories would be appropriate for a single prince, or at most four chiefs. Social stratification and hierarchy are clearly implied. The battle-axes, like the several diadems of Syros and Amorgos, and the golden sword-hilts of Levkas, seem to be emblems of chieftainship rather than simply rich goods.

LATER PERIODS

During the early bronze age, as we have seen, wealth, hierarchy and authority are indicated by the artefacts found. They are yet more clearly indicated in Crete in the middle and

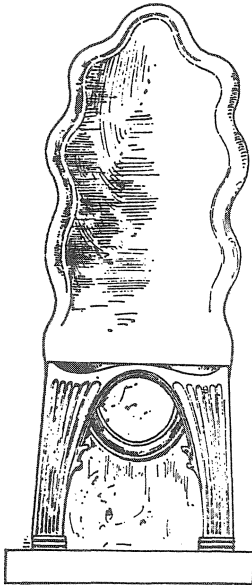


FIG. 18.5 The symbol of princely authority: the Late Minoan throne in the Palace of Minos at Knossos (*after Evans*). Ht 1.40 m.

late bronze age, and in mainland Greece from the end of the middle bronze period. (Our material from the earlier Middle Helladic period is unfortunately much more limited.)

The palaces of Crete might themselves be taken as indicating the existence of a prince. This is underlined by the throne of stone in the last palace at Knossos (fig. 18.5), and by the treasuries of the palaces, especially at Zakro. That the palaces imply just such a hierarchical structure in the first palace period is documented for us by the magnificent associated groups from the First Palace at Mallia.

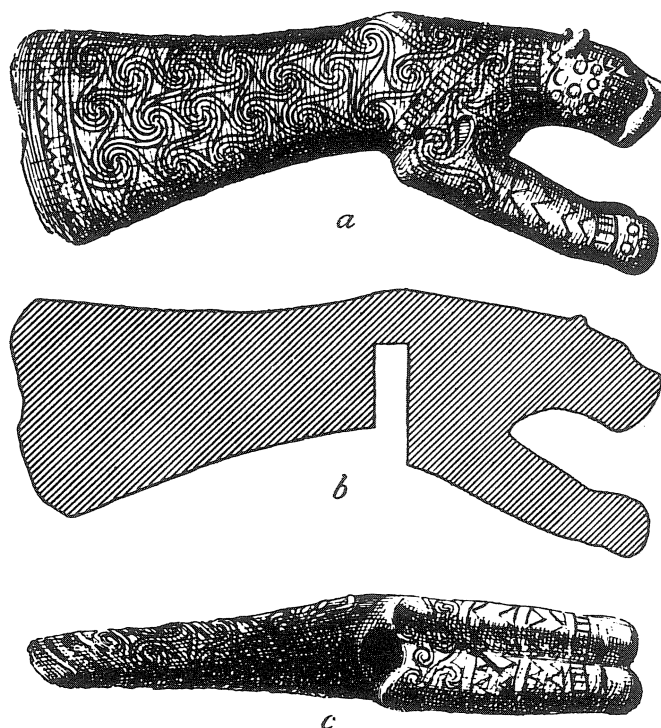


FIG. 18.6 Ceremonial axe-head from the Middle Minoan palace at Mallia. This symbolic 'axe' (made of schist) was found together with the ceremonial longsword, fig. 16.6 (after Evans). Length 15 cm.

Mallia Treasure I was found together in Room RVI.II, just west of the central court at Mallia (Chapoutier and Charbonneaux 1928, 25, fig. 3; Charbonneaux 1925). It consisted of a sword, a dagger, a bronze bracelet, and a shaft-hole sceptre, with a pottery vessel (fig. 18.6). Charbonneaux originally dated the find 'not later than Late Minoan I' but the context clearly sets it in the First Palace period (Hutchinson 1962, 186; Pendlebury 1939, 118); Pendlebury dated it to Middle Minoan I, and Evans set the sword at the transition from Early Minoan III to Middle Minoan I.

The great sword (fig. 16.6) is 80 cm long in the blade. It has a hilt of fine limestone, covered in sheet gold, and a beautiful pommel of crystal. The sceptre of brown schist (fig.

18.6) is in the form of a panther straining on the leash, and covered with an elaborate design of interlocking spirals derived from the stone vases of the early bronze age. Of course it merits comparison with the display axes of Troy II, already discussed, and the crystal pommel finds counterparts in the same treasure, Treasure N, as contained the axes at Troy. But the sword is unique, the earliest known from the Aegean. As Pendlebury puts it, we may regard the group as 'part of the regalia of the king of Mallia' (1939, 118).

Mallia Treasure II consists of two swords of display found in 1936 north of Quartier III at the north-west corner of the palace (Chapoutier 1938). These swords, although



FIG. 18.7 Warrior aristocracy: stone stele from Shaft Grave V at Mycenae (after Evans). Ht 1.33 m.

dated to the Middle Minoan III by Hutchinson (1962, 188), seem to belong, with the ruins of the First Palace, to the Middle Minoan I or II period (Branigan 1968a, 64). Both swords had the round shoulders and short tang of Karo's type A (cf. Sandars 1961). The first was of length 81 cm, while the second, of length 72 cm, was fitted with a magnificent pommel. The lower part of this pommel, of bone, was decorated with a beautiful gold roundel portraying an acrobat, his body forming a circle by bending the legs backwards until they touch the top of the head. It is one of the masterpieces of Minoan art.

These two finds eloquently indicate the princely status of the ruler of Mallia, who was equipped with these splendid weapons of display. Clearly the sceptre, like the axes of Troy, was not intended for use, but had a purely symbolic value.

The later prehistoric periods in Crete provide abundant further evidence of this kind: the tombs of Zapher Papoura, and the warrior graves near Knossos serve to indicate the existence of an aristocracy, while the Royal Tomb of Isopata hints at the wealth of the prince.

A fascinating example of pecuniary emulation in the late bronze age is afforded by the practice of burying in the tombs pottery vessels coated with tin foil so as to have the appearance of silver plate (Immerwahr 1966). They are not usually found in the princely *tholos* tombs, where real metal vessels could be afforded, nor in the poorer of the chamber tombs, but generally in the richer and better equipped chamber tombs (ibid., 386). These were the grave goods of aristocrats who existed, none the less, on a markedly lower social level than the princes.

The evidence for social stratification in the Mycenaean world is comparable with that from Crete. The incredibly rich finds of the Shaft Graves document the rule of a very wealthy, princely dynasty from at least the end of the middle bronze age (fig. 18.7). The earlier grave circle, Circle B, is less wealthy than Circle A, so that the riches of the dynasty were increasing at the onset of the late bronze age. That they continued to do so is clearly indicated by the impressive *tholos* tombs of Mycenae. The rich finds at Vapheio, at Dendra, in Messenia, and at Kakovatos and at other sites, together with the *tholos* tombs themselves, testify to the rule of analogous dynasties elsewhere.

But all this is sufficiently established by the enormous contrast between the finds of Pelos, Kephala or Paterna around 3000 BC, at the beginning of the early bronze age, and the regalia of Mallia around the twentieth century BC, not long after the end of the early bronze age. The Cycladic graves supply the best detailed indication of the nature of the transition, where a disparity in personal wealth is shortly followed by clear indications of social stratification, and ultimately of chieftains.

Ownership and the Development of Redistribution

The craft specialisation of the late bronze age palaces, so clearly indicated in the material record, was sustained by the system of redistribution centred upon them. The clear indications of the storage of large quantities of foodstuffs were described in chapter 15,

and reference made to the system of agricultural production quotas and palace rations indicated by the tablets. Such a system was functioning already in the first palaces of Crete in the Middle Minoan period, as the indications at Mallia clearly show. Already there are palace stores and workrooms, and the hieroglyphic tablets seem to be the direct precursors of those of Linear A.

It is during the third millennium that the origins of this redistribution system must be sought. Indeed there is already evidence for granaries of large size, as we have already seen.

In a simple village economy, where each household functions largely as an independent economic system, consuming the bulk of what it produces, the scope for trade or redistribution is limited. This is clearly seen in many rural villages in Greece today, for many households do not produce a significant surplus which (in a modern folk economy) they could sell at market. In Crete in 1948, for example, the average annual cash income of the majority of the population, the poorer 60 per cent, has been estimated at twenty-six dollars (Allbaugh 1953, 491).

Probably it is only with the development of some systematic circulation or transfer of goods that problems emerge in establishing ownership, provenance and destination. It seems plausible, therefore, to associate the emergence of seals and sealings in the Aegean in the third millennium BC with the movement and apportioning of produce in this way. On their own they need not indicate any centralisation in the movement of produce, although this is not excluded. But they do hint at some kind of distribution or exchange system, however it may have been structured.

In Crete the art of seal engraving reached an early high point in the Early Minoan period. Seals of Early Minoan II date are documented from Lebena, Mochlos, Myrtos, and possibly Krasi and Sphoungaras (Kenna 1960, 15; Warren 1969c, 25; Warren 1970, 31). The Mesara tombs contain a great abundance of seals, some of which must also date from this period; Kenna's survey gives a clear indication of their range and variety (fig. 6.7). Unfortunately the actual use of the seals is not well documented, for clay sealings or seal impressions are not found in the tombs, from which the bulk of our evidence for Early Minoan Crete comes. Myrtos (Phournou Koriphi) again has yielded a sealing with impressions of two different seals.

It seems likely that most men, or at least most family heads, possessed their own seal. Although the Mesara tombs had all been robbed during their period of use as well as subsequently, and many seals have perished with the years, an order-of-magnitude impression may be gained of the correlation between seals and daggers.

The number of burials was originally, no doubt, very much larger than these figures might suggest.

We must imagine each man or householder marking his own produce or his own goods with his personal seal, making the sealings already documented from the Early Minoan period and so common later. There would be no point in this if the goods were to remain in his personal store, at home. The sealings therefore seem to indicate not so much the emergence of a concept of ownership but of a *distinction between ownership*

and immediate possession. If the goods were exchanged on a purely face-to-face basis, the ownership would be transferred immediately with possession, as is normal in barter transactions. Here, however, the suggestion is that the goods remained in some sense 'his', as goods belonging to or consigned from the owner of the seal, even after they left his possession.

In the centralised palace administration, it may be supposed, many of the consignments of goods entering the palace from the outlying dependencies would be sealed and stamped to show their place of origin. The whole elaborate system of accounting seen in the tablets must have grown up in order to cope with the problem of systematically

TABLE 18.3 Comparison of the number of daggers and sealstones found in some of the Mesara tombs, suggesting that each male occupant may originally have been buried with a single dagger and sealstone.

<i>Mesara Tomb</i>	<i>Daggers</i>	<i>Seals</i>
Koumasa B	25	20
Koumasa A, E, γ	11	13
Kalathiana	7	6
Platanos	70	45

disposing of these consignments. Many deposits of sealings have come from the palaces: the most important from Middle Minoan Knossos are the Hieroglyph Deposit and those from the Temple Repositories (Kenna 1960, 37 f.). And in the Archives Deposit, of Late Minoan date, sealings were found associated with Linear B tablets. That we possess only a tiny fraction of the seals originally in use (and a totally insignificant proportion of the sealings) is indicated by the remarkable fact that none of the sealings yet found appears to be the impression of any seal now extant (*ibid.*, 58).

Further clues about the use of the seals are given by the countermarks on some of the sealings, incised in Linear A or B script (Gill 1966) and by the important observation of Marinatos, discussed by Betts (1967), that several sealings from Sklavokampos near Knossos were made from the same seal or signet as sealings at Aghia Triadha and Zakro. Clearly too the seals will have had many functions, not all of them economic: some of them are thought to have been of talismanic significance.

The existence of seals in the Early Minoan period, although apparently indicating a systematic circulation of goods, perhaps on a basis of credits or of obligations, does not necessarily imply a central agency of the kind provided by the palaces in Middle Minoan times. The system could have worked on a more flexible, inter-personal basis. Indeed Kenna has called attention to a decline in the style and execution of seals at the beginning of the Middle Minoan period, a decline so striking that 'lessened prosperity would not have had so profound an effect....' This state of affairs was reversed in Middle

Minoan II, but in the interim there seems to have been a change in the character and use of the seal, perhaps contemporary with greater changes in the social and political structure of Crete' (1960, 32). It is tempting to correlate this change with the emergence of a centralised system, organised at the palaces which were founded at this time. The greater simplicity of a palace-based redistribution, where most consignments were either to or from the palace, may have contrasted with the earlier, more complex situation where a much greater number of people, including local village chiefs, were recipients. Any explanation at present is conjectural, but the central point remains that seals and sealings must have been an important element in the economic life of the Early Minoan period, and that this practice of sealing subsequently became an integral part of the redistribution system of the palace economies.

Seal stones are much rarer elsewhere in the Aegean, during the third millennium, than in Crete. Several are known from Poliochni, including a cylindrical seal of ivory which may be an import (pl. 23, 3; Brea 1964, 587 and 653; 1957, fig. 25). Several terracotta seals of both button and cylinder form were found by Schliemann at Troy. A cylinder of blue stone was found in the principal building of the Second City at Troy, while Blegen found a sherd with a seal impression in the Second City levels (Schliemann 1880, 415–16; Blegen et al. 1950, 256), although the pottery was of imported fabric. A stamp seal was likewise found at Thermi (Lamb 1936a, 172).

The evidence for actual seals in the Cyclades and the mainland is similarly limited. A grave at Kapros in Amorgos yielded a cylinder seal (pl. 23, 2), while a small square button seal was found in the Kouphonisia (Dümmler 1886, pl. 1, 1). Pots at Chalandriani in Syros are decorated with seal impressions (Bossert 1960, 12, fig. 11), quite apart from the series of stamped circles and spirals with which the 'frying pans' and other vessels were decorated.

Several seals are known from mainland Greece, from Zygouries, Raphina, Asine and Aghios Kosmas (Blegen 1928, pl. XXI, 4; Theochares 1953, fig. 15; Frödin and Persson 1938, fig. 172, 1 and 3; Mylonas 1959, fig. 166, 13). There are also a few impressions (Blegen 1928, fig. 91.1; Frödin and Persson 1938, figs. 160.2 and 172). It had at first been thought that these mainland finds were of Cretan origin, but the whole situation has been transformed by the find of a large deposit of sealings in the House of the Tiles (fig. 7.7), from the Korakou culture at Lerna. The complete absence of actual seals from the preserved remains at Lerna suggests that they may have been of wood, and were it not for this major find we should have no indication of the importance of seals and sealings on the mainland at this time. It may well be that seals were in frequent use at other sites as well, and perhaps also in the Cyclades and the eastern Aegean.

The main Lerna deposit (Heath 1958; Wiencke 1969) is slightly later than a further group found near the House of the Tiles. The main group consisted of fragments of 124 sealings, with the imprints of 70 different seals. Five different kinds of sealing operation are indicated by the impressions on the reverse of the sealings, which show imprints of poles from large boxes, of reeds, of the circular necks of jars, and of the mouths of jars.

The actual designs of the seals were predominantly continuous line motifs. Levi has commented upon the similarity in design with sealings found at Phaistos, suggesting that the Lerna seals might have been the work of Cretan craftsmen (1958b, 190). Mrs Sakallariou following a suggestion of Caskey believes that they may be of Cycladic work, together perhaps with those of Phaistos (Sakallariou-Xenaki 1961–62, 79). But to attribute these seals to overseas craftsmen may be to undervalue local potentialities. At present it seems safest to follow Heath's view that they were the product of 'an independent and perhaps local school of seal cutting'.

The main point here, however, is not the origin of this particular glyptic style, but the function of the sealing. The circumstances of the find, in the small Room XI of the House of the Tiles, is clearly very significant. This great building 25 m long and 11.7 m wide yielded few finds other than these sealings and some pottery; a mass of melted lead was also found with traces of burnt timbers in Room XII. Its size (pl. 20, 1; fig. 7.5) and the respect which was paid to the site in the period of the succeeding Tiryns culture (when it was covered by a low mound and building there was avoided) indicate its significance. Caskey has well said, with appropriate caution, that we are 'probably justified in calling the House of the Tiles a palace, though with a clear admission that we have no certain knowledge of the political organisation which that word implies'.

This central building was preceded at Lerna by an earlier edifice, Building BG, belonging to a prior phase of the same culture. Built on a different axis, Building BG was itself 12 m wide and contained a great ceremonial hearth of clay (pl. 20, 3). This large building is described by the excavator as 'a prototype and precursor of the later palace'.

These large central buildings at Lerna, together with the fortification wall, would in any case indicate some degree of central authority. The sealings give the strong presumption that some kind of redistribution of goods was taking place, although there is no suggestion that the central organisation was supporting full-time specialists. The existence of some ruler or chief, on whose authority dues were collected, or under whose patronage exchanges were transacted, seems indicated.

The important central building of Troy II and the Rundbau of Tiryns, whatever their precise function, are likewise indications of central organisation and probably of the rise of chiefdoms. We see, therefore, that the first palaces of Crete had precursors in several parts of the Aegean. And although the evidence is tenuous, the building remains preserved indicate, in Greece and the Troad, the emergence of a central organisation. The seals and sealings give an insight into the economic factors favouring this social and political development.

Hostility and the Inception of Warfare

The evidence for hostility and for war in the Aegean, like that for wealth and hierarchy, first becomes convincing during the third millennium BC. This is clearly documented both by the evidence of weapons, and by the remains of defensive works.

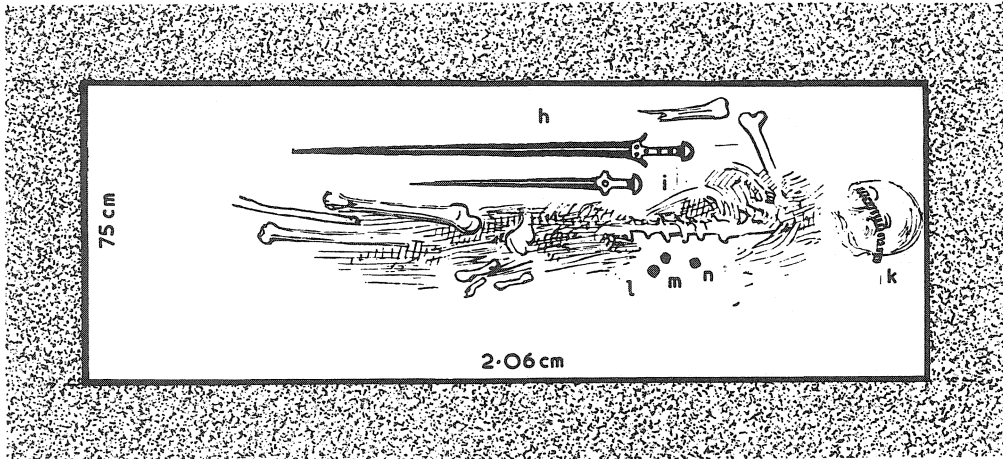


FIG. 18.8 Warrior aristocracy: the Late Minoan 'Chieftain's Grave' in the Zapher Papoura cemetery, with its long- and short-swords. Length of longsword, 96 cm (after Evans).

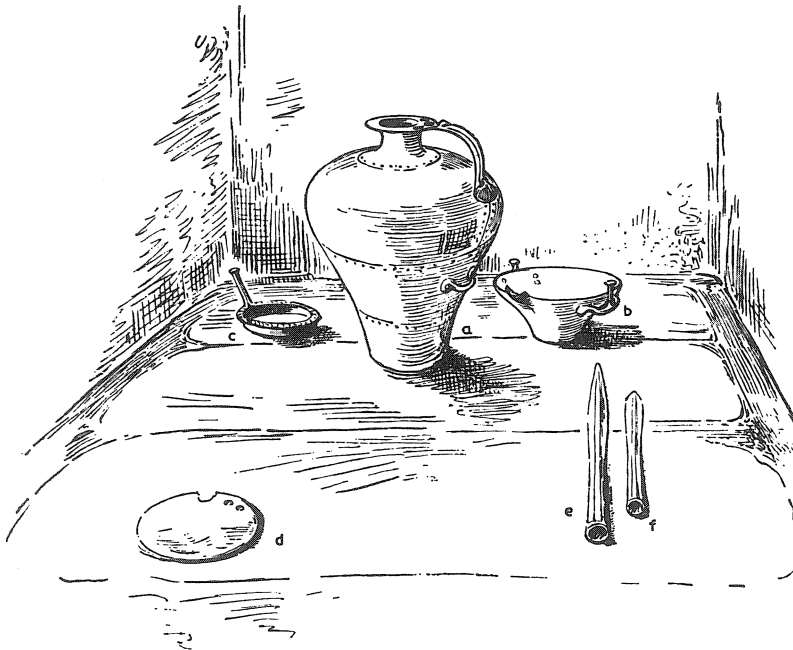


FIG. 18.9 Grave goods above the covering slabs of the 'Chieftain's Grave' (after Evans).

THE NEOLITHIC PERIOD

No weapons, as distinct from projectiles for the hunt, have been found from the neolithic period. The baked clay slingstones commonly found in neolithic Greece may, of course, have been used in armed hostilities, just as we know them to have been in later times. The bow was discussed briefly in chapter 17: it remains perfectly possible, however, that the tanged points found on the Greek mainland and the Cyclades during the later neolithic were arrowheads. Several well-made flint spearheads from the late neolithic of Thessaly (Tsountas 1908, pl. 42, 14–18) are roughly contemporary with those from Saliagos, which are made of obsidian (Evans and Renfrew 1968, fig. 61).

The practice of fortification can give a more reliable indication of inter-village or inter-regional hostilities. Nea Nikomedeia may conceivably have had some defensive works in early neolithic times (Rodden 1965, 84), while during the middle neolithic period two sites in Thessaly, Sesklo (Tsountas 1908, 75) and Magula Hadzimisiotiki, had enclosing walls possibly defensive in purpose, although this is not certain. Servia in Macedonia at about this time was surrounded by a ditch, possibly defensive in purpose (Heurtley 1939, 45). The outstanding example of a site apparently fortified during the neolithic period, although in the late phase, is afforded by Dhimini (fig. 18.13, 1). While less impressive in appearance on the ground than it appears in plan, the site has a central area enclosed by several lines of concentric circuit walls of stone. It is clearly the precursor of such early bronze age citadels as Troy. The concentric arrangement emphasising the significance of the central buildings contrasts markedly with the altogether democratic arrangement of the earlier neolithic villages. Fortification walls of stone were found also at Emborio in Chios in later neolithic levels.

These are the most important indications that life in late neolithic times may have been less peaceful than is often supposed. It is clear that while the range of weapons available in neolithic times was extremely limited, inter-village hostility at least may have been fairly widespread.

THE THIRD MILLENNIUM

Weapons for hand-to-hand conflict were not made in the Aegean until the third millennium. Those of the huntsman, the bow and the spear, were probably also used in warfare, although the bow not very widely. A great pile of sling-stones was found at Panormos in Naxos outside the small fortified gate (Doumas 1964, pl. 484, b). The spearhead was now of bronze, but its pre-eminence as a weapon was replaced by that of the dagger. Indeed henceforward the spear is nearly always found accompanying a dagger. This is the case for the three graves in Amorgos where the spear has been found in good association (Tsountas 1898, Graves 12 and 14; Bossert 1954, cf. Dümmler 1886, pl. 1, 7 and 8) and for grave R 9 in Levkas (Dörpfeld 1927, pls. 62 and 63 a). The slots in their blades would have been of considerable aid in the hafting to a shaft of wood (fig. 16.5; Bossert 1954, pl. 15,4). The two weapons may together be regarded as constituting

the equipment of the bronze age military man: if a single weapon was carried, it would usually be the dagger.

Henceforward the dagger, or its direct development, the sword, was the first and essential weapon. The existence of these sharp blades of bronze, stoutly hilted in wood, must have transformed hand-to-hand fighting, for until this time the basic weapon may well have been the wooden staff. The dagger's great popularity is very clearly documented by the numerous finds from Amorgos (Renfrew 1967a, pl. 89), and especially by those in the Cretan tombs, where no fewer than 250 have been found. Although in many cases primarily a weapon, the dagger was a dual purpose object, serving also as a knife. Not until the late bronze age were these two functions clearly differentiated. Finds of knives are rare in the early bronze age (see chapter 16), yet there were more bronze knives (and more razors) in the rich late bronze age Zapher Papoura cemetery

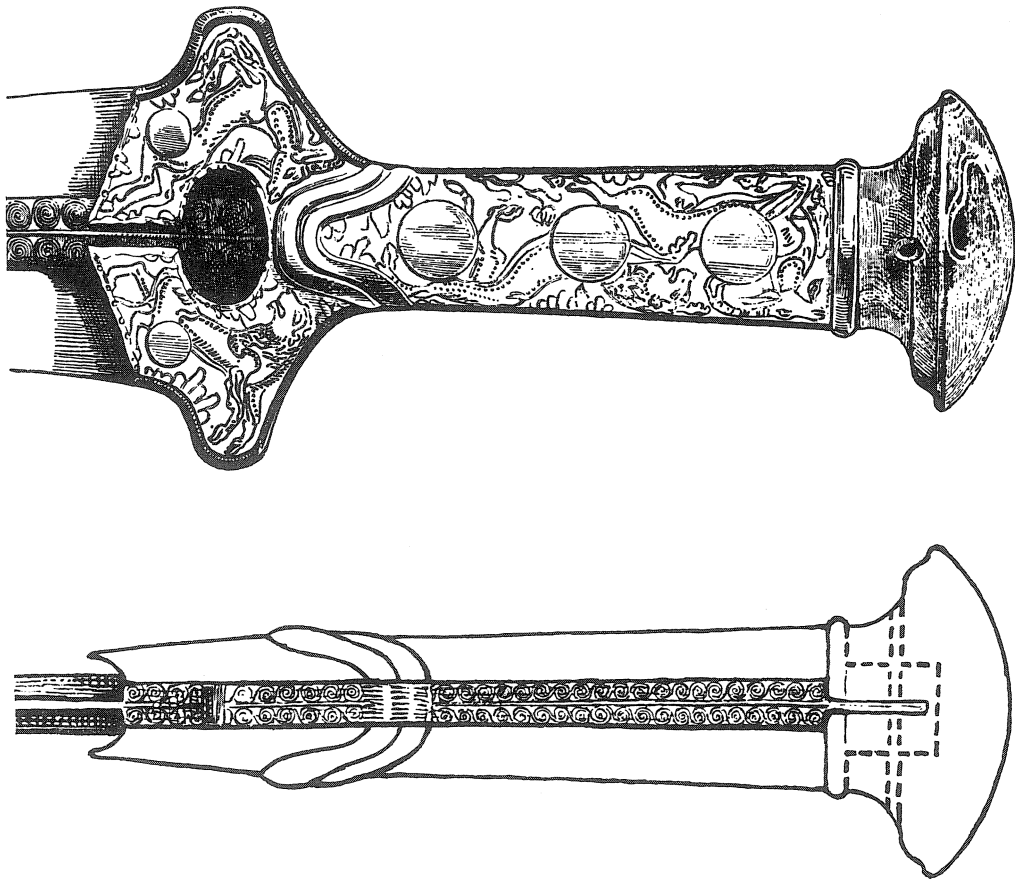


FIG. 18.10 Richly decorated golden hilt of the short sword from the 'Chieftain's Grave' (after Evans). Pommel diam. 4.4 cm.

near Knossos than all the weapons there put together. It seems possible that most adult males in Early Minoan Crete were buried together with a dagger, and that this, particularly in the case of the short dagger of type III, served them in life also as a knife, and perhaps even as a razor. As we shall see the custom of burying every man with his dagger did not continue in Mycenaean times.

The evolution of the dagger to the long sword has already been touched on (chapter 16). The splendid swords of Middle Minoan Mallia, for example (fig. 16.6), were preceded by the earlier and less developed forms from Amorgos and the Levkas graves, where the hilt was sometimes encased in sheet gold.

The correlation between personal status and the possession of richly adorned weapons cannot be over-emphasised. The graves suggest that a fine weapon was an essential mark of status for any rich and important man. For their time the weapons of Levkas or Amorgos were remarkable enough, but they are insignificant beside the splendid Mallia swords. And they, in turn, cannot compete in splendour with the beautifully decorated dagger blades of Mycenae.

The defensive works in the Aegean during the third millennium (figs. 18.11 and 18.12) testify to the rise of militarism in the area. They culminate later in the great walls of Mycenaean Tiryns, in the splendidly fortified citadel of Troy VI and in the walled town of Phylakopi II. It is noteworthy, however, that no fortifications are found in Crete either during the third millennium or in the period of the palaces. This seems paradoxical in view of the quantities of weapons buried with the dead, for these can hardly all have been intended for use overseas. Nor do the geographical peculiarities of Crete explain why it lacked fortifications in the prehistoric period: in early Greek times civil strife was exceedingly common (Ormerod 1924, 143). Even the existence of a sea-going fleet, sufficiently powerful to eradicate pirates (a doubtful development at this time) would not prevent internal strife. Some further social factor may have done so; the agglomerate plan of Cretan buildings in the neolithic period already hints at some social organisation of individual settlements.

The fortifications of a few later neolithic sites in the Aegean have already been noted. The situation is not so very different in the Early Bronze 1 period. What may have been a defensive ditch is recorded from the Eutresis culture site at Perachora-Vouliagmeni, and similar defensive works are seen at Argissa in Thessaly. In the Cyclades the only settlement of the Grotta-Pelos culture for which possible fortification evidence has been found is Zoumbaria on Dhespotikon, but the wall there is not very impressive, and its dating is uncertain, since the cemetery was used also in Keros-Syros times.

Stone-built fortifications are well documented only in the eastern Aegean in the Early Bronze 1 period. Emborio in Chios had been fortified with stone already back in the final neolithic, although plans are not yet available. The extent of the defensive works is clearly seen only at Troy, where the first fortifications may already have had a gate on the south side (Mellaart 1959a, 133). In the middle Troy I levels (which in Aegean terms may already be on the border of the Early Bronze 2 period) the fortifications were extended to the south, with gates to the east and south-east. The fortifications at Troy

formed a ring less than 100 m in diameter, so that the site was a citadel rather than a township.

Poliochni Blue (Poliochni II), at the beginning of the Troy I period, was also fortified, and the fortifications were extended and strengthened in succeeding periods. The town site of Thermi in Lesbos, like Poliochni, was unfortified in the first phase of its occupation but may have had defences during Thermi III (Lamb 1936a, 24). The fortifications of Town V (fig. 8.4) are probably to be set in the succeeding period.

In the Aegean Early Bronze 2 period, fortification was more common and more efficient. Several sites on the Aegean coast of the Greek mainland now had stone fortifications. The complete extent of those at Askitarío has been planned (fig. 18.11, 2) and

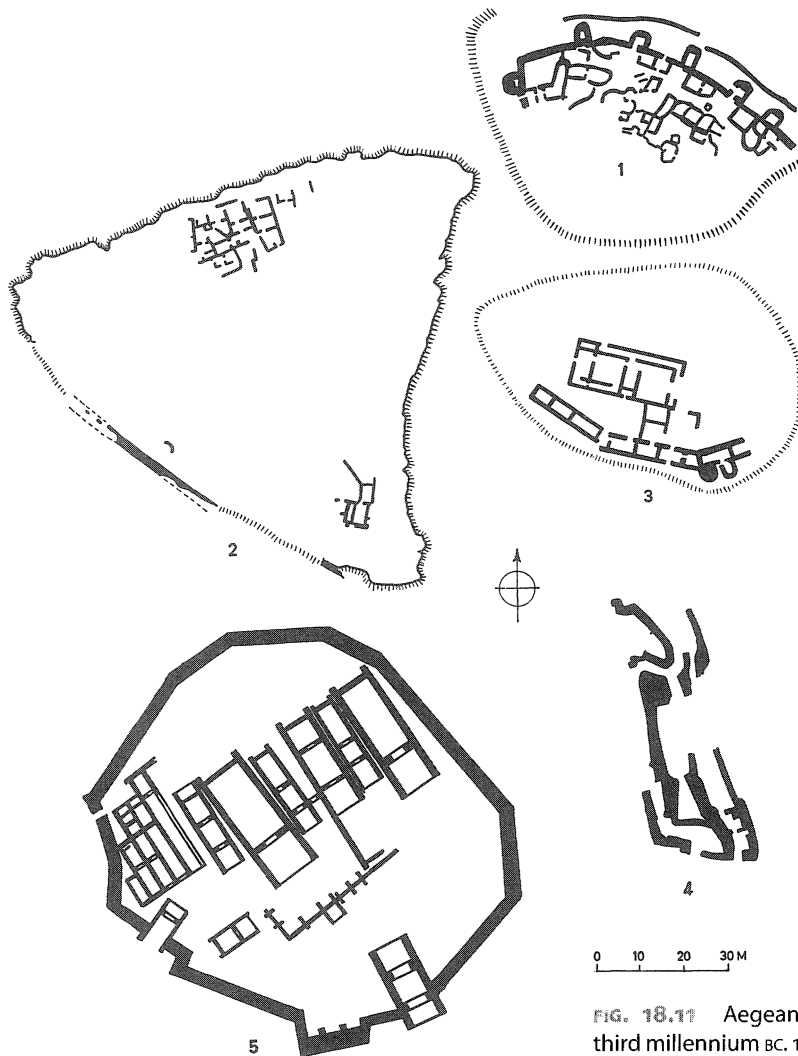


FIG. 18.11 Aegean fortifications of the third millennium BC. 1, Chalandriani; 2, Askitarío; 3, Lerna III; 4, Aegina; 5, Troy II.

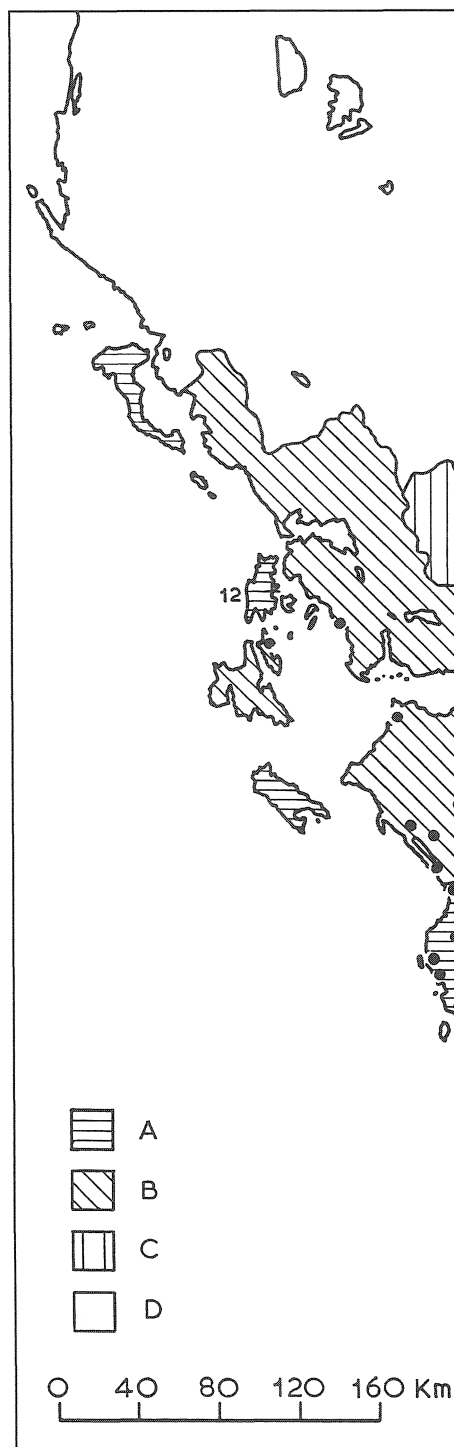
FIG. 18.12 The correlation between major early bronze age sites (fortified settlements and cemeteries) and regions of significant olive production.

Squares denote fortified settlements, crosses the major cemeteries (others being known in Crete and the Cyclades). Dots indicate some of the findspots of 'sauceboats' of the Korakou culture, to indicate its distribution.

The olive production is classed as follows:

- A. Regions where the olive yield (in metric tons) is greater than the yield of grain (wheat, barley and oats, in metric tons).
- B. Regions where the olive yield is greater than $\frac{1}{2}$ yield of grain.
- C. Regions where the olive yield is greater than $\frac{1}{10}$ yield of grain.
- D. Regions where the olive yield is less than $\frac{1}{10}$ yield of grain.

(See notes to the figures for list of sites, p. xx.)





small stretches are seen at Manika (fig. 14.15) and at Aegina. At Lerna (fig. 18.11, 3) the Korakou culture settlement was fortified by a wall strengthened with semicircular bastions (pl. 20, 2). Rather similar bastions are seen at the little Keros-Syros culture fort of Kastri near Chalandriani on Syros (figs. 18.11, 1 and 11.4; pl. 21, 1). Although most of the finds there are of the Early Bronze 3 period, the wall may have been built in Early Bronze 2 times. The rather similar fort of Panormos on Naxos (fig. 11.4; pl. 21, 2) was also constructed then.

There is a corresponding interest in stone defences in the eastern Aegean, where the walls and gates of Troy II (fig. 18.11, 5) were extended. The remodelled south-east gate is a more impressive affair than its predecessor (Mellaart 1959a, 137–62), and the south-west gate was now approached by a paved ramp. Poliochni V (Yellow), of the same date, was also fortified, and early in this period Town V at Thermi (fig. 8.4) gives very clear indications of fortification.

No very important advance in fortification is seen during the Early Bronze 3 period. But in the middle bronze age the great development in the defences at Troy VI finds a Cycladic counterpart in the massive wall at Phylakopi (pl. 21, 3). They were, with their large blocks of stone, much more formidable than the dry-stone defences of Chalandriani or Lerna. The walls of Akroterion Ourion on Tenos may be of this date. In the mainland too the defences became much more solid, as the walls of Aegina or Argos eloquently testify.

This rapid development during the early bronze age of the art of fortification, which takes us from the ditches of Vouliagmeni or Argissa to the massive walls of Phylakopi and Troy VI, graphically indicates the transformation in Aegean society. It correlates precisely with the development of weapons already reviewed—from the short daggers everywhere appearing at the end of Early Bronze 1, to the impressive long swords seen in Amorgos, Levkas and Mallia at the close of the early bronze age. War had developed from the neolithic skirmish to organised attack by well-armed warriors.

Two other developments occur at precisely this time, and the correlation is not likely to be fortuitous. The first of these, already discussed, was the emergence of wealth; a prize worthy of the risk now awaited the attacker. The cost and labour of constructing solid fortifications became a worthwhile insurance against such raids.

Secondly the Aegean ship, with thirty oarsmen, so much faster and more manoeuvrable than neolithic boats, was built (see chapter 17). In medieval times this was still the favourite craft of pirates. The impact of piracy upon the location of settlements was discussed in chapter 14 and is reflected too in their fortification. The strong walls of Troy or Lerna, like those of Phylakopi or Chalandriani, were built to withstand raiders from the sea. Ormerod (1924) in his detailed study of Mediterranean piracy in the Greek and Roman period stressed the analogies between those times and the Middle Ages. As we have suggested, the same generalisations would seem to hold for the early bronze age: the thirty-oared vessel favoured two thousand years later by the pirates of classical Messenia (Ormerod 1924, 30) was already available.

Here too, as already suggested in chapter 14, may be one clue to the absence of fortifications in Crete. Crete, like Messenia, enjoys the advantage of extensive cultivable lands lying further than one or two kilometres from the coast. Many of the more important sites of early bronze age Crete—like Knossos itself, or Vasiliki, or the settlement of the Mesara—were situated inland. The fortified settlements of the Aegean early bronze age are, with few exceptions, set on or near the coast. The need for trade and communication clearly outweighed the dangers from sea-borne raiders. It may be, then, that the military threat came chiefly from the sea. It could fully be overcome only by a complete mastery of the sea, such as King Minos was later reported to have enjoyed.

THE LATER BRONZE AGE

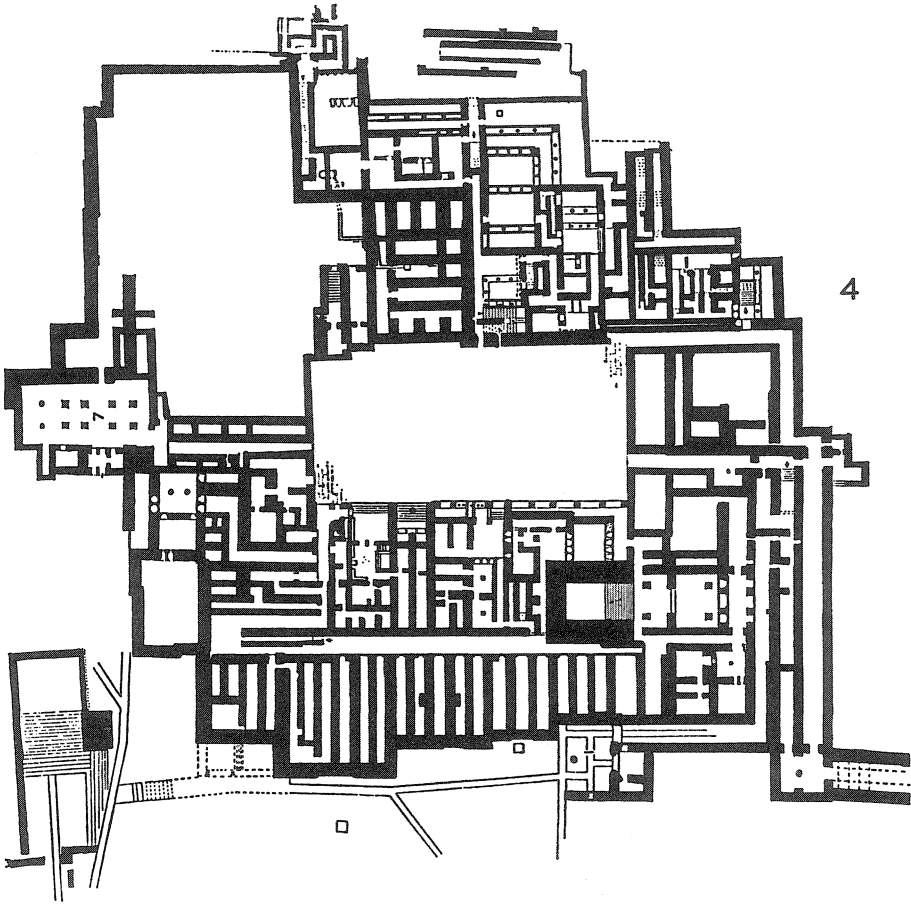
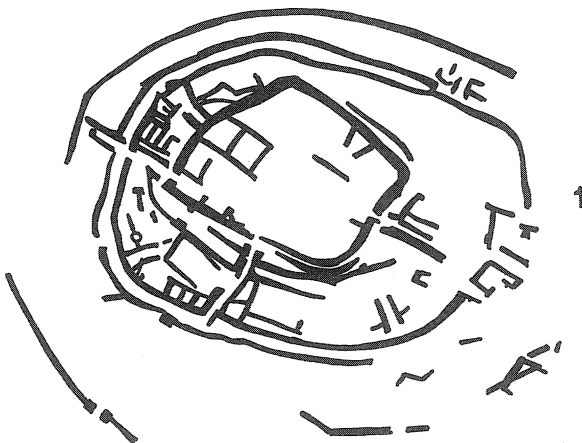
By the late bronze age the finds suggest that we may even think in terms of a warrior aristocracy in the Aegean. For the ruler it was a point of pride to possess the most magnificent weapons, like those of the Mycenaean Shaft Graves, and the most impressive armour, such as the boar's tusk helmets and the corselet from the Dendra *tholos*. It is noteworthy on the other hand that the ordinary chamber tombs at Mycenae—which may be contrasted with the architectural magnificence of the *tholoi*—rarely contained weapons. The 'Warrior Graves,' especially near Knossos, are overwhelmingly military in aspect (figs. 18.8; 18.9; 18.10). Yet, although rich, they do not compare in wealth with the Mycenaean Shaft Graves, nor with what we may imagine to have been the contents of the *tholoi* at Mycenae and the Royal Tomb at Isopata. The Warrior Graves were not the burial places of princes but of wealthy adepts in war.

As we have seen, already in early bronze age times, the basic weapon was the dagger, to which the spear might be added. The same remained true in the late bronze age, and generally the owner of a magnificent long sword would wear also a short sword or dagger. One of the Warrior Graves at Aghios Ioannis near Knossos contained a veritable armoury in addition to a beautiful gold cup, a pottery lamp and two exquisite seal stones. The long sword and two daggers were accompanied by a large thrusting spear, smaller spears or javelins of various types, and arrowheads (Hood 1956).

By the late bronze age Aegean a warrior aristocracy had grown up, headed by the prince himself, very much as Homer portrays. The rich R graves of the early bronze age in Levkas appropriately document its earlier origins.

The Growth of the Community

Settlement numbers and population increased during the prehistoric period, in some areas rather steadily. So did settlement size, although the rate of increase does not compare with that in some areas of the Near East. The evidence was reviewed in detail in chapter 14. That the Aegean settlements of the early bronze age and even of the late bronze age were, in terms of size, not much greater than villages was there conceded.



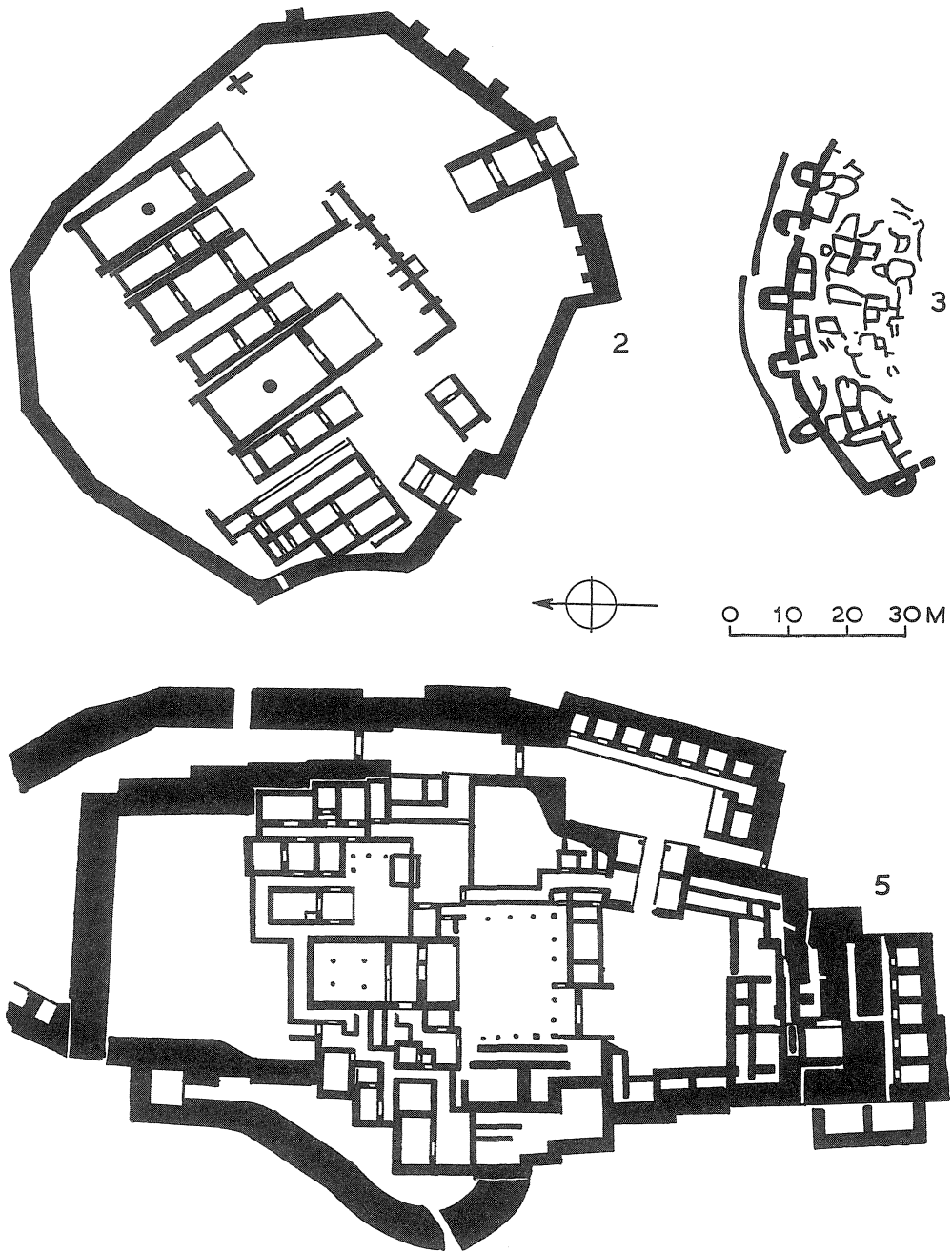


FIG. 18.13 The evolution of settlement in the Aegean. 1, late neolithic Dhimini; 2, early bronze age Troy II; 3, early bronze age Chalandriani; 4, Late Minoan Knossos; 5, Mycenaean Tiryns (upper citadel). All at the same scale.

Their proto-urban character arises not so much from a change in scale as from a change in function (fig. 18.13).

The neolithic village, as we have seen, was essentially homogeneous in plan. Nea Nikomedeia, on the open plan like Căscioarele (fig. 5.1) and Knossos, on the agglomerate plan (fig. 6.4, 1) like late neolithic Hacilar, are made up of essentially similar units, repeated many times. In complete contrast, Early Bronze 2 Troy or Lerna, while not very much larger, were enclosed by stone fortifications defending important buildings such as the House of the Tiles, or the Trojan 'Great Hall'. However, these were not necessarily the home of a ruler, some precursor of the Minoan-Mycenaean prince. The Rundbau at Tiryns may well have been a granary, and the sealings of the House of the Tiles indicate a predominantly economic function.

The non-homogeneous settlement plans nonetheless indicate major social changes as well as simply architectural ones. The differentiation in building size obviously indicates a distinction in function, and the disparity in function undoubtedly implies specialisation in occupation by members of the population, and almost certainly a differentiation in status.

The preceding sections of this chapter have documented as much, and we should note that the locus for the new range of functions is precisely this proto-urban township. All the varied functions are concentrated in this one small 'container'. We do not find villages of smiths, villages of traders, villages of fishermen or villages of farmers, distinguished one from another. The single settlement contains the entire range of occupations known to the society, just as does the palace in the late bronze age. This, in effect, is what the geographer knows as the town, although in view of their small size we have cautiously termed these settlements proto-urban.

In this chapter it is the social meaning of such changes which interests us. The concentration of this new variety of functions within the proto-urban container implies a new social environment for each inhabitant; he lives now in a world where some men are skilled craftsmen, others are not. Some have wealth, some have high status, and whether or not the social system allowed such mobility that each individual could aspire to the more prestigious statuses or functions, these were indisputably part of his environment. The social environment of the slave is more varied and hence richer, whether or not more agreeable, through the eminence of his master. Similarly, whether or not hostilities were of frequent occurrence, their possibility—with the consequent need for defences and for weapons—added a new dimension to the life of the citizen, just as the arms race and the threat of nuclear war do to our own, even in time of peace.

We have seen that in the third millennium BC, craft specialisation emerged. Wealth was a product of the new crafts, and with it came a social hierarchy symbolised by the graves of Levkas, the diadems of Mochlos or Chalandriani and the treasures of Troy and Poliochni. A redistributive economic organisation is already implied by the emerging craft specialisation, and is indicated by the seals and sealings of Myrtos or Lerna. That it was a centralised redistribution emerges from the Lerna sealings, and is implied again in the magnificence of the treasures of Troy. These various features are the very

attributes of the chiefdom as defined at the beginning of this chapter. The developments in religious life, described in the next chapter, conform to this picture. Only the kinship structure at present escapes us. Succession by primogeniture is, as we have seen, a usual feature of the chiefdom, and the existence of a nobility, generally related by kin to the chief. These we cannot yet document.

Precisely these features are prominent, however, in the Homeric account of Mycenaean civilisation, and the great number of burials in the Shaft Graves at Mycenae indeed suggests that not simply the chief or prince, but his immediate family also, were distinguished by especially sumptuous burial.

Setting aside this possibility of a kin-determined hierarchy, we see in the third millennium chiefdoms, the obvious and logical predecessors of the second millennium principality or state. In social terms as much as in economic ones, the chiefs of Chalandriani, Myrtos or Lerna may be seen as the logical predecessors of the palace princes of Phylakopi III, Mallia and Mycenae. Aegean prehistoric society evolved just as naturally and predictably as did Aegean craft technology. For just as craft technology produced a new material environment, so these new configurations in society produced a social environment that was complex, varied and highly structured.

Chapter 19

Symbolic and Projective Systems

Reason is a very inadequate term with which to comprehend the forms of man's cultural life in all their richness and variety. Hence, instead of defining man as an *animal rationale*, we should define him as an *animal symbolicum*. By so doing we can designate his specific difference, and we can understand the new way open to man—the way to civilisation.

ERNST CASSIRER (1944, 26)

Go, go, go, said the bird: humankind
Cannot bear very much reality

T. S. ELIOT, *BURNT NORTON*

When the archaeologist seeks a definition for man, he usually turns pragmatically to the notion *homo faber*, man the toolmaker. The concept is certainly a workable one archaeologically, for only the material record of man's past survives, and to choose this very record as a defining feature is to make the best of the available evidence.

But no one takes this definition too seriously: no one is very surprised to learn that the other modern primates sometimes make tools. Everyone is aware that the most fundamental distinction must lie in a different sphere—in the way man thinks. It is indeed difficult to have knowledge of other minds otherwise than through the behaviour of other people, and the quality of thought is too personal an attribute to form the basis of a working definition for the archaeologist. Yet many of man's abilities and behaviour patterns seem to spring from his *self-consciousness*: from his self-awareness in the world, and from his acute awareness of his place in the world.

By his ability to see himself he is enabled also to see the world more clearly. He builds for himself, indeed, a picture of the world which embodies his observations and beliefs. Every man has such a world-picture, such a *Weltanschauung*. By permitting him to visualise, to imagine, it enables him to reason about the future as well as the past, to consider alternatives, to make plans. It facilitates, too, far more than coolly rational thinking. Man, more keenly aware of the world, is cognisant now of its mysteries and of its dangers. Death, something which he has seen and remembered, finds a place in the world-picture, as well as pleasure, sorrow and fear. These too become matters for contemplation and for action.

In all his actions, other than purely reflex actions, a man responds as much to his picture of the world as in direct and immediate response to the world itself. The joint members of a single culture hold in common many features of such a picture: they have a common understanding of subsistence problems, for instance, and overcome them

by techniques different from those used by members of other cultures. All this was implicit in the discussion in chapter 1 on the nature of culture. The reconciliation in practice of all these pictures of society, possessed by its members, results in the social system. And to alleviate the mystery of the world beyond, the *au-delà*, the reach of the unknown, society forms a picture of the controlling forces, giving them superhuman forms to which man may appeal and which may intercede for him. These pictures are projections: the society projects man's fears and aspirations onto the world, makes gods in his own image, and acts out in religious or civic ritual his hopes and fears.

In this way the abstract becomes concrete: feelings or thoughts dimly felt or sensed, are given form—the forms are symbols of the idea. Ernst Cassirer has well expressed this special feature of human experience and human behaviour (1944, 24–25):

'No longer in a merely physical universe, man lives in a symbolic universe. Language, myth, art and religion are parts of this universe. They are the varied threads which weave the symbolic net, the tangled web of human experience. All human progress in thought and experience refines upon and strengthens this net. No longer can man confront reality immediately; he cannot see, as it were, face to face. Physical reality seems to recede in proportion as man's symbolic activity advances. Instead of dealing with the things themselves man is, in a sense, constantly conversing with himself. He has so enveloped himself in linguistic forms, in artistic images, in mythical symbols or religious rights, that he cannot see or know anything except by the interposition of this artificial medium.'

In a sense, most of the activities of man can be considered in this way, as we saw in chapter 1, interposing a cultural buffer between himself and the world of nature. Some of them of course are simply logical and direct responses to his primary needs and their immediate derivatives—the subsistence activities, those of craft production, of securing goods over distances, even of 'living together in cities.' These are elaborations of activities already seen in simpler form among other species—for instance in a beehive. In other concerns, however—and this is what interests us in this chapter—aspects of the world-picture are actually given tangible symbolic form: images of the gods are fashioned, regalia instituted for the ruler, sorrow and desire expressed in song and dance. It is to these patterns of activity, where man's understanding, feelings and thoughts about his world are given formal and often concrete expression, that the name symbolic or projective systems is here given.

The whole field of religious activity of a culture forms a particular projective system: a temple or shrine and all the observances related to it respond to man's view of the world. Their urgent reality, for the culture to which they belong, is no less than the reality, for instance, of the subsistence subsystem with its inflexible exigencies. Religion and ritual constitute a complex and expensive technology for dealing with the unknown, a major projective system.

Often, too, alongside the social system and indeed a part of it, are activities and objects specifically *symbolising* the social realities to which they relate. The king wears his

crown, the pharaoh lies buried in his pyramid; and the coronations and royal burials form part of another projective system symbolising, and stabilising, the social order.

The whole world of the arts—painting and sculpture, acting and mime, music, dance—gives formal expression in the analogous way, to man's feelings in face of the world: these too are projective systems.

Some of these activities are often classed as non-functional. Yet the religious activities of a culture, for instance, however meaningless they may seem to an outsider, have a real and vital role within it. To regard them as 'non-functional' is to make a subjective judgement, and to undervalue the role which non-material concepts have in many societies. To the society's members they may have a more lively reality than, for example, an accounting system, which is to the same extent a projection of a world-picture as is a series of religious formulae. The notion, for example, of an annual obligation on a stock-farmer of so-many sheep, irrespective of the fluctuations of fortune, is a very abstract one, yet is highly functional on anybody's definition. In the Minoan-Mycenaean palaces purely utilitarian accounts are found side-by-side with tablets, interpreted as recording offerings to various deities. No purpose is served by designating one obligation as non-functional, the other as functional.

These considerations are all relevant here since the symbolic systems have a real interaction with the other subsystems of society. Stonehenge, or the Treasury of Atreus, or the Pyramids are artefacts which undoubtedly impinged upon and meshed with the economic system, but they are intelligible only as projections of concepts about the world. The movements of the sun and moon mattered to the inhabitants of southern Britain in the later third millennium BC, just as the death of a ruler mattered at Mycenae or in Old Kingdom Egypt.

In the sections which follow, various aspects of the projective systems of Aegean pre-historic society are discussed, with particular reference to the evidence for their early development. They bring us close, once again, to the core-idea of what civilisation is.

In defining civilisation in chapter 1 as the multi-dimensional environment created by man, detailed reference was not made to man's world-picture as conceived here, since this is an abstraction which for the archaeologist is difficult to handle. But civilisation may certainly be viewed in these terms—by reference to the progressive and fundamental changes which man's view of the world, and the world-view shared by the participants in a culture, undergo. This is precisely why many historians of culture put particular emphasis on the symbolic system and especially upon the arts, as manifestations of civilisation. In chapter 1 we saw how some writers, such as Frankfort, think in terms of 'style' when defining civilisation. Such an approach has not been followed in the present work, but certainly a culture's symbolic achievements—its monuments, its literature, and so on—give a deep insight into the multi-dimensional environment which its members came to create for themselves, and in which they lived.

The growth of Aegean civilisation cannot be understood without a consideration of the changes in the projective systems. Their development in the third millennium is considered in the succeeding sections.

The Description of the Physical World

Language must undoubtedly be man's earliest descriptive system. By neolithic times in Greece the spoken language, inevitably, will have been a flexible instrument. Very possibly, languages ancestral to more recent Indo-European languages were already spoken in the Aegean, although this can only be conjecture. The language of the Mycenaean world and of the late occupation at Knossos, as reflected in the Linear B tablets, is now widely (although not universally) recognised as Mycenaean Greek. It is possible that in early bronze age times, the language of mainland Greece and perhaps of other Aegean areas may have been the direct ancestor of Greek. But whether this is so or not, verbal expression may be assumed to have been so effective, already long before that time, that changes in the language during the bronze age can have had only a marginal effect upon its practical effectiveness as a descriptive system.

Certain new concepts, however, do seem to have emerged. And while, from the modern standpoint, the invention of written language seems the major civilising achievement, during the bronze age it was probably in the first instance simply a further aid in overcoming the problems of mensuration and reckoning.

Already in chapter 18, the evidence of seals and especially sealings as suggesting the development during the early bronze age of a redistributive system, has been indicated. Underlying the existence of an orderly exchange organisation there must be several very fundamental concepts. The first and most crucial of these is the *potential equivalence of goods and services*.

Of course in neolithic times, goods were undoubtedly frequently exchanged, sometimes in fulfilment of obligations, and on other occasions by barter. A man wishing to obtain obsidian from his seafaring neighbour will have received it, perhaps, in exchange for grain. No doubt approximate units of equivalence may have been established, just as the oxhide ingots of the late bronze age (fig. 20.6) are often supposed (although perhaps without good evidence) to have been worth one ox.

The systematisation of such concepts made possible the centralised storage of goods, in the House of the Tiles, for example, or later in the palace stores (see chapter 15). It meant too that one party in an exchange transaction did not necessarily receive his repayment at once, whatever its ultimate form, when delivering his own produce. Undoubtedly his contribution will have been of definite recognised value, not solely in its own terms (e.g. if wheat in terms of bushels of wheat) but in terms of other commodities, or services which he could expect in return. The crucial importance of such an exchange system, such an equivalence however organised, is discussed in the final chapter.

Already a redistribution system of the kind seen fully developed in Mycenaean society hints at the need for written records. There was apparently no organised market, with a direct exchange rate for various commodities: individuals had instead long-standing obligations for payment in kind, and a record of such payment was required. Until the system became too complex the records could be kept orally, by public agreement. But already a prior necessity existed for units of quantity, and for a numerical system to com-

pound them. A prerequisite for any redistributive system handling real commodities is a means for determining their quantity. Units of size, weight and capacity are essential.

MENSURATION AND NUMBER

By the late bronze age lead weights, specially made in disc form, are seen at Phylakopi in Melos (pl. 18, 3; Renfrew 1967a, 4, pl. 2a; Atkinson et al. 1904, 92). A whole graduated series of them has been found at Aghia Irini on Kea (Caskey 1969, 439, fig. 9) where they were multiples and subdivisions of a unit of about 65 gm. Similar weights have been found at several late bronze age sites in Greece and Crete and in the Cape Gelidoniya wreck (Evans 1921–35, IV, 654; Karo 1933a, 247; Bass 1967).

Bronze scales were found in a grave at Mavrospelio near Knossos, together with weights (Forsdyke 1927, 253, fig. 6), and similar scales have been found in Mycenaean contexts at Mycenae, Vapheio and Thebes, and ‘symbolic’ or toy scales of gold in Shaft Grave III at Mycenae (Wace 1932, pl. xxix, 20; Karo 1933a, 247 and pl. xxxiv). Earlier finds of scales are not known, but it seems likely that weight will have been used as a criterion of quantity as soon as materials were available of sufficient worth to make precision desirable. This supposition is confirmed by a very interesting find from early bronze age Troy.

In the ‘Great Treasure’ of Troy II, amongst the metal plate and the weapons, six ‘bullion bars’ of silver were found (fig. 19.1). Their dimensions are given in Table 19.1 (Schmidt 1902, 237, although there is a misprint here in the weight for no. 5970, cf. Schliemann 1880, 470, nos. 787–92).

TABLE 19.1. Dimensions of silver bars found in Treasure A of Troy II.

<i>Bar</i>	<i>Length (cm)</i>	<i>Width (cm)</i>	<i>Weight (gm)</i>
A (No. 5697)	17.5	3.0	170.8
B (No. 5698)	17.4	3.1	172.0
C (No. 5699)	18.5	4.0	172.3
D (No. 5970)	18.3	4.2	173.8
E (No. 5971)	21.3	5.0	182.7
F (No. 5972)	21.6	5.1	189.2

These bars are obviously in pairs: this is clear from the length and width, without considering the weight. Comparing now the weights within pairs, we find they are exceedingly close, nos. A and B differing by only 1.2 gm, C and D by 1.5 gm, and E and F by 6.5 gm—respectively 0.7 per cent, 0.9 per cent and 3.6 per cent of the weight of the bars. These figures are so close particularly when the corrosion of the bars and the reported accretion of oxidation products, especially on Bar F, be considered. Each bar was clearly intended to be the same weight as its partner.

The first pair (A and B), taken with the second pair, yield a mean weight of 172.2 gm, with a mean variation of 0.8 gm, or 0.5 per cent. Again the two pairs were obviously intended to be the same weight, although the shape is slightly different. Such precision can only have been achieved with considerable competence in weighing.

The third pair differs so much from the others that a different weight was probably intended—the six bars, if lumped together, have a mean weight of 176.8 gm, with a much larger variation of 6.0 gm or 3.4 per cent. While it seems too ambitious to recognise these as ‘the third part of the Babylonian silver mina of 8656 gm’ (Sayce in Schliemann

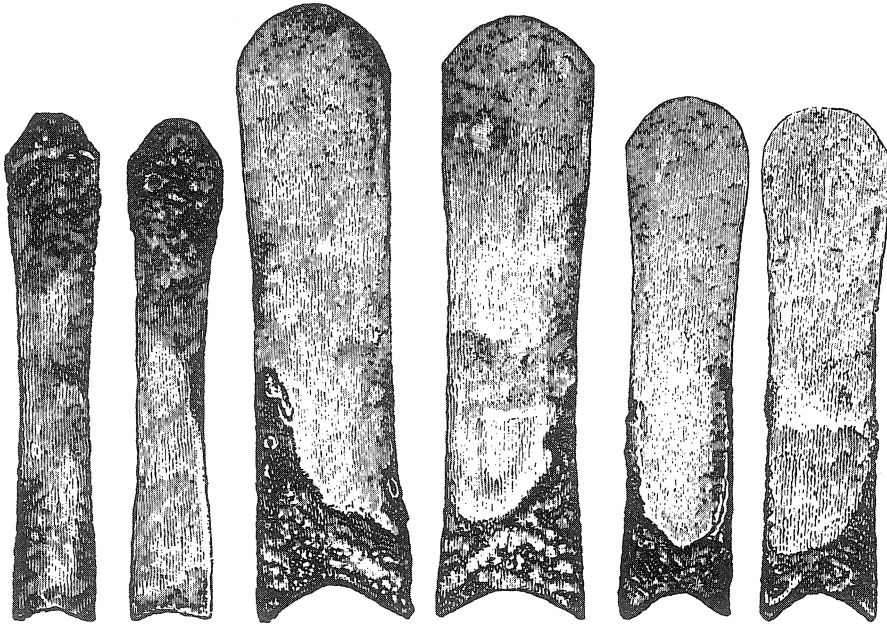


FIG. 19.1 Evidence for mensuration: silver ingots from the Great Treasure of Troy II (after Schliemann). Max. length 22 cm.

1880, 471) we may at least draw the important conclusion that the early bronze age smiths of Troy were weighing bullion to an accuracy of a gram or two.

Though it is not yet possible to document for the early bronze age the existence, even locally, of weight standards such as existed in the late bronze age, it seems likely that such standards developed locally as weighing became a routine operation. Certainly by the late bronze age a complex system was in operation. The important find at Knossos of a large stone weight of 29 kilos, decorated with an octopus carving, is supplemented by the copper ingots from Aghia Triadha, which are likewise of 29 kilos. This is a unit which Ventris and Chadwick have assumed to be the ‘talent’, the largest weight unit of the Linear B tablets.

The existence of units of capacity in late bronze age times is likewise documented by the tablets (Ventris and Chadwick 1956, 55; Palmer 1963, 14). Units of measure for

subsistence and other commodities in the middle bronze age are implied by the hieroglyphic inscriptions (Evans 1921–35, I, 282; Ventris and Chadwick 1956, 31). But the archaeological record does not so far document these units, and there is therefore no hope at the present of carrying them back into the early bronze age.

Mensuration implies an efficient counting system, and this again is amply documented by the tablets. A decimal notation was adopted for the hieroglyphic tablets of the Minoan late bronze age, and continued with minor changes in notation into the Linear A and Linear B tablets.

Fractional quantities were handled in the middle bronze age by means of straightforward vulgar fractions, sub-divisions of the unit in question, and the same method was used in the Minoan Linear A script. But in Linear B a new more sophisticated system was adopted, analogous to our own complicated one for weight: 1 ton, 3 cwt, 2 qr, 15 lb, etc. Instead of employing a fractional notation, a whole hierarchy of smaller units was employed: each unit is indeed a specified fraction of the preceding, but the writing of fractions is avoided. This clearly implies a whole series of named units in a fixed relation, one to another. In the early bronze age simple vulgar fractions are more likely to have been in use. The Minoan numerical system was used for addition and subtraction and could have been used for multiplication, division, and even the extraction of square roots, although such use may be unlikely (Anderson 1962).

These developed concepts of number were not simply applied to movable objects. Graham (1960; 1962, 226) has discussed how Minoan architects laid out their palaces using a standard measure of length, the Minoan foot, of 30.3 cm. The major dimensions of the palaces were round numbers of this basic unit: the central courts of Phaistos and Mallia measured 170 by 80 Minoan feet, while that at Knossos seems to be of the same order. There can be no doubt that the Minoan palaces were carefully planned in advance: there is little haphazard or informal in their disposition. Since the palace at Mallia was originally laid out, probably in much its present form, in the Middle Minoan I period, this metric and architectural competence was already available early in the second millennium BC.

Indeed Caskey suggests that the dimensions of the House of the Tiles at Lerna may indicate the use there of a foot of 30 cm, various walls, doorways and staircases apparently having been laid out using this foot (1955a, 40). The length and width of the House of the Tiles may be interpreted as 80 and 40 feet respectively, and the earlier structure below the House of the Tiles has a comparable width.

Another possible case of careful metric planning during the early bronze age, involving ratios, without a fixed unit of length, is offered by the Early Cycladic folded-arm figurine. Preziosi (1966b, 20) has suggested that many of these adhere to strict canons of proportion, laid out with the aid of compass and ruler. Critical assessment of this very interesting suggestion must await the full publication of her study: her arguments do, however, seem very plausible, and may account for some of the peculiarities and variations in the proportions of these remarkable objects.

Great competence in the measurement of weight and of length is thus already attested in the early bronze age, possibly with the use of standard units such as are clearly seen in late bronze age times.

Curiously, however, there is no evidence in the Minoan-Mycenaean civilisation for astronomical observation or computation. What are interpreted as month names appear on the tablets (Ventris and Chadwick 1956, 304), with lists of 'ritual offerings', presumably gifts appropriate to a particular time of year. But there are no texts like those of Babylon or Egypt relating to astronomy. Nor are there monuments, such as those of Central America or prehistoric Britain, of calendrical significance. The central courts of the three principal palaces of Crete were indeed oriented along the same axis, approximately north-south. But there is no need to relate this to careful astronomical observations. Two thousand years after Stonehenge, time was still reckoned in Greece in the informal manner employed by Hesiod:

'The cry of the migrating cranes shows the time of ploughing and sowing.'

'Vines should be pruned before the appearance of the swallow.'

'When the snail climbs up the plant there should be no more digging in the vineyard.'

Undoubtedly the Minoans and Mycenaeans will have observed the movement of the stars. Yet it is somehow typical of these civilisations that the passage of the months should be noted, not by reference to the movements of the celestial bodies, but of the birds and even the invertebrates of the terrestrial world.

WRITING

The two basic elements of any system for recording are distinguishing marks, and a numerical notation. Even in the late bronze age these form the essential of the records, where almost every line ends with an ideogram (designating the commodity) and the number (indicating quantity). The syllabic text of the tablet merely amplifies the description of the goods, and specifies their source or destination.

As we saw in chapter 18, seals and sealings of the early bronze age already fulfilled some of these functions, indicating ownership (or source), and possibly also the nature of the commodity.

During the early bronze age there was also a series of pot marks, especially at Phylakopi (fig. 19.2). These marks incised on the body or more generally the base of the pot before firing obviously embody a numerical notation.

It is possible, indeed, in the Aegean to see an evolution in the expression of meaning by means of incisions upon clay. In the late neolithic at Sitagroi in Macedonia, clay roll-cylinders are seen with incised decoration, which, like those of Poliochni (Yellow) and Kapros in Amorgos, will have been used to stamp moist clay. At the same time in the Balkans, around 4000 BC in radiocarbon years, signs were incised on pots and even on clay tablets (Todorović and Cermanović 1961, 42; Schmidt 1903, figs. 38-39; Vlassa 1963, 485). They bear a superficial resemblance to the pot marks of Phylakopi I some

two millennia later. In phase III at Sitagroi many spindle whorls are found with incised motifs, which are simply decorative in intent. These are rare in phases IV and V at Sitagroi, but analogous incisions become very common at Troy during the early bronze

age (fig. 17.3). The percentage of the whorls at Troy which are decorated in this manner is as follows: Troy I: 9 per cent; Troy II: 22 per cent; Troy III: 39 per cent; Troy IV: 68 per cent; Troy V: 62 per cent; Troy VI: 'marked reduction' (Blegen et al. 1950, 50 and 217; 1951, 15, 116 and 232). Schliemann considered these signs on Trojan spindle whorls, and also cylinder seals, to represent writing, comparing them indeed with those of south-east Europe. Sayce even attempted their decipherment (Schliemann 1880, 691). Since these signs in the Balkans and Troy were not succeeded by the development of a well-defined hieroglyphic script, to regard them as writing hardly seems warranted. But we should none the less recognise that the Balkan signs are not markedly different in kind from pot marks seen at Phylakopi and elsewhere, and that the evolution of signs on the whorls has points of comparison with the development of the Early Minoan seals.

Evans (in Atkinson et al. 1904, 181) made a systematic study of the 'pottery marks' found at Phylakopi largely in levels of the First City, and recognised among them four classes:

1. Geometrical marks either traditional or of arbitrary origin;
2. Pictographic signs;
3. Signs identical with those of the Knossian Linear script;
4. Numerals.

Unfortunately, it is not now possible to specify the stratigraphic context of each group, for Hogarth (1898, 12) wrote of Aegean signs on pottery evidently of the Second and Third Cities also. But it is clear that signs were first incised on the pottery in the early bronze age, and continued to the middle and late bronze age, when signs of the Minoan Linear A and B scripts are seen. A sherd of Middle Helladic Grey Minyan ware from Naxos is also incised with a Linear A sign (pl. 26, 2). Pottery marks or signs of this kind are common in mainland Greece during the middle bronze age, although they are not apparently found during the Tiryns culture.

The Hieroglyph Deposit, which at Knossos first documents a coherent written notation, is dated towards the end of the Middle Minoan period (cf. Kenna 1960, 37 f.). But the important and ear-

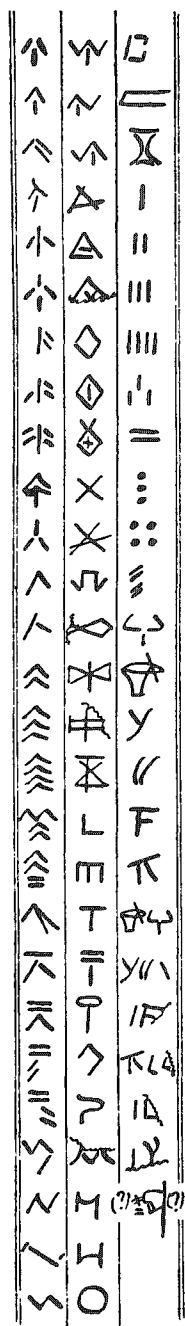


FIG. 19.2 The beginnings of writing: incised signs on pottery from Phylakopi in Melos (after Hogarth).

lier series of sealings of Middle Minoan Ib/IIa date from Phaistos implies a meaningful notation, although hieroglyphic inscriptions are not included (Levi 1958; Fiandra 1968). Hieroglyphic signs are seen on seals of the 'Early Minoan III' period (Hutchinson 1962, 64), and Branigan (1969a, 17–19) has stressed the affinities between signs on the Phaistos sealings (and on Early Minoan sealstones) and those of the early hieroglyphic script.

It would thus be possible to claim that 'writing' began its development in the Aegean during the early bronze age. Certainly the use of sealstones (which, as emblems of ownership, are already signs of a special kind) involves the use of schematic signs. Signs are seen on pots too, and from the Middle Minoan I period on building-stones. Doubtless they occurred on other less permanent classes of objects. However it seems safest to view such signs and seals as simply a stage where linear decoration and the use of symbols merge inextricably, as at Troy, and as earlier in the Balkans. Out of this wealth

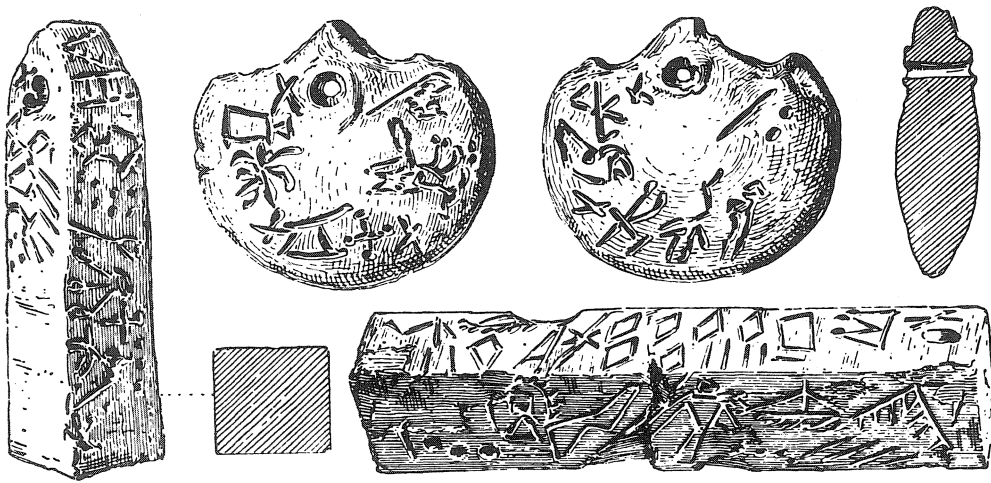


FIG. 19.3 Hieroglyphic inscriptions on clay tablets of Middle Minoan date from Knossos (after Evans). Scale almost 1 : 1.

of linear decoration and of symbolism, hieroglyphic writing, embodying significant sequences of such signs, emerged during the First Palace period.

Kenna has written (1962, 1): 'In all Asian civilisations where seals have been used, there has also been a tradition of writing. It would seem that the very impress of the seal upon the clay which was to secure a door, chest or jar and so prevent unauthorised entry, inclined Asian people to use and make other special and recognisable signs to identify, record and then to communicate with one another; to be understood by sign as well as by sound.' This effectively expresses the frequent connection between the two activities. Both were indispensable operations of the developed palace redistribution economy.

The next stage in the development of writing, the use of signs to represent sounds rather than ideas, may have come about under the influence of the Near Eastern syl-

labaries, then in being. But it is not inconceivable that the transformation from ideogram to syllabic symbol was a local one. Hutchinson (1962, 65) has suggested that such developments can already be discerned in the later hieroglyphic script in Crete: 'The A hieroglyphs were usually executed as silhouettes, though sometimes internal details were carefully recorded: but those of Script B or "the developed hieroglyphic script", as it is often called, were executed in a more summary fashion, outlines already suggesting that a conventional script would develop out of the old hieroglyphs.' The Minoan Linear A script may have developed from the advanced hieroglyphic script. Significantly perhaps the change to a more elaborate (and probably Near Eastern) fractional notation did not occur until later.

In any case, Minoan writing, as the evidence has come down to us, was not much used other than for accounting purposes. As Dow (19554, 127) rightly concluded: 'The Cretans expressed themselves more and better in other ways than in writing.' Just a few objects are preserved with inscriptions, in some cases dedications perhaps, in the Minoan Linear A script (Pugliese-Carratelli 1957; 1963). But we have neither the long religious texts of the Egyptians nor the monumental inscriptions of the Mesopotamian kings. Writing in the Aegean was a practical instrument, permitting the use of pragmatic concepts of number, of weight and measure, and the compilation of dues and of inventories. Other kinds of text may yet be found, but so far the only abstract concepts and symbols which they embody are these utilitarian and organisational ones. The record shows that some of these concepts were already developing in the early bronze age.

THE DEPICTION OF THE WORLD

Counting and measuring are activities employed to systematise and codify the physical world, which happily do leave some trace in the archaeological record. The primacy of language as a symbolic system has already been indicated, but unfortunately there is little the prehistorian can say in this direction. The vocabulary would certainly, if known, yield an important insight into the interests and preoccupations of the community. Some modern food-gathering communities, for example, have exceedingly full and elaborate vocabularies for plant species, and several Arabian tribes have rich and complex vocabularies relating to camels. The 'pre-Greek' words preserved in classical Greek must presumably have been in use in Greece at least prior to the late bronze age. Those designating plants are very numerous, and exceed in precision the vocabulary of modern demotic Greek, where so many plants are dismissed as *chorta*. Of particular note are *bussos* and *karpessos*, both words for flax, a plant perhaps not used before the early bronze age. Birds were also classified with more precision than in recent times.

A keen eye for nature is reflected also in the art of the late bronze age, where the botanical detail was sometimes very closely observed. Möbius (1933) has discussed Minoan plant representation: the white lily, the beach narcissus, the saffron flower, iris and myrtle are commonly seen in faithful detail. Olive leaves, fig trees and date palms

also occur as well as the papyrus plant. Some of these plants are represented already in the middle bronze age, and the Early Minoan gold jewellery at Mochlos included sprays of leaves, and a golden flower (fig. 6.8).

Another favourite source of subjects was the sea, and in the Late Minoan Ib period the octopus and nautilus especially, among marine subjects, are frequently seen. Birds, the third subject of special interest to the Minoan nature painters, have been the subject of special study by Miss Sylvia Benton.

Karo (1933a, 293) has analysed the animal species represented among the finds of Shaft Grave Circle A at Mycenae. The result is interesting, for in the Mycenaean world the interest seems to have been rather in animals than in plant or marine life. The order of frequency of species was as follows:

19 occurrences: lion; 12: bird; 10: horse; 6: stag and griffin; 5: octopus; 4: leopard and ox; 3: dog; 2: butterfly, dolphin, antelope; 1: panther, wild goat, fish, mussel, nautilus, sphinx, sea monster.

The emphasis here on animals of the chase contrasts with that in Crete, where bulls, Cretan wild goats, monkeys and marine subjects are most common among the animals.

Of course the choice of subject is very much an artistic convention. The scarcity of animal representations on the pottery of the neolithic and early bronze age is a reflection above all of the art style of the period. In fact, carvings and stone beads of birds are not infrequent in the Cycladic early bronze age, and in Crete we have ivory seals in the form of birds, monkeys and lions.

Emily Vermeule (1964a, 317) has listed the plant and animal species recognised in Mycenaean art, as well as in the Linear tablets. Trees seem distinctly under-represented when comparison is made with the range of species in the vocabulary used by Homer. Edible plants and domestic animals, although naturally more common on the tablets, do not emerge as a popular subject for illustration. The overwhelming emphasis in the art is on wild plants, wild animals, birds and marine species.

Human beings are seen in frescoes and decoration (although rarely on the pottery) during late bronze age times. In earlier periods, however, the human representations are rarely just decorative in intention: they are figurines or statuettes made with a specific, often religious, purpose. Monsters and imaginary beasts are not an important feature of Minoan art, although the griffin and sphinx occur occasionally in late bronze age times (Nilsson 1950, 368 f.). Curiously, however, imaginary beasts are seen on Middle Cycladic vases (Zervos 1957, figs. 268 and 271): probably they are simply a decorative frivolity. In general, prehistoric art in the Aegean was not inspired by the fecund imagination of the Mayas or Aztecs, nor by portentous scenes of human affairs.

From this discussion, we can begin to glimpse the picture which the Minoans and Mycenaeans had of the physical world, and how they felt able to describe it. It seems in some ways similar to our own, with a sound grasp of weight, measure and reckoning, and a vivid appreciation of nature. Nearly all the descriptive devices of the late bronze age already had their origin in the third millennium.

Society as a Projection of Itself

Perhaps because men wish their society to conform to the image or picture they have of it, the appearance is as important in human affairs as the reality. 'Justice must not only be done: it must be seen to be done' is a philosophy which permeates most cultures: a bank should *look* prosperous and secure—like a bank in fact; the home of a ruler must *look* like a palace; if there is to be a funeral, let it be a *good* funeral.

This outlook need not necessarily imply the conspicuous consumption or display of wealth, or competition: it is more than just 'keeping up with the Jones's'. The desire is simply that the reality should conform to society's picture of it: it should symbolise itself. This desire is fulfilled by the symbolic forms with which the reality of leadership are clothed: the royal throne in the royal palace, the royal tomb, the princely processions.

The throne at Knossos (fig. 18.5) and the regalia of Mallia (fig. 18.6)—the great long-sword and the ceremonial battle-axe—have already been discussed. They are the symbols which society needed to emphasise its structure. Monumental tombs, such as the Royal Tomb at Isopata near Knossos, or the Mycenaean *tholos* tombs, also emphasise the pre-eminence both of the deceased ruler and of his successor.

The might and ferocity of the warrior was emphasised by the magnificence of the weapons buried with him—here the inlaid daggers of the Mycenaean Shaft Graves, and the choice of weapons in the Warrior Graves at Knossos emphasise the point. The hard fighter was also a hard drinker, and gold cups often accompanied him to the grave; at Zapher Papoura, a complete outfit for drinking was buried (fig. 21.2).

The culture of neolithic Greece gave little scope for such symbolism, although doubtless such evidence as may have existed has disappeared. There were few specialist craftsmen, and the skilled man would not automatically have been recognised by the tools of his trade, like the occupant of the carpenter's grave at Zapher Papoura (fig. 17.1). While there may have been village leaders, there were no regional princes to be commemorated by monumental built tombs. There were no central administrative buildings to be embellished with frescoes and dressed stone. There were no stone-built fortifications whose strength might be symbolised by guardian lions, as in the Lion Gate at Mycenae.

During the early bronze age many of these symbolic forms can be seen to emerge. The weapons of display of Treasure L of Troy II (fig. 18.4) perhaps symbolise the supreme status of the ruler at Troy, just as did the leopard axe at Mallia. The beautiful gold and silver drinking vessels of Treasure A not only document for us the wealth of the ruler of Troy II. Undoubtedly they symbolised for his citizens the prosperity and magnificence of their chief.

Again, the military prowess of the chiefs of early bronze age Levkas is not merely documented by a bronze dagger or two: it is symbolised by the decorated golden sheath which covered that dagger's hilt (fig. 18.3, 1). In the same way, in the silver daggers of Early Minoan Koumasa we may see the prototypes of the superb weapons of display of the late bronze age. The pre-eminence of the rulers of the Plain of Nidri in Levkas and

of their families was marked also by the erection of large circular cairns, up to 9 m in diameter, above their remains—just as a grave in a special precinct, and marked with a stele, commemorated the Early Mycenaean prince, and a magnificent built *tholos* his later bronze age successor.

By contrast, however, there is yet no evidence that the central buildings of the early bronze age communities or strongholds were embellished or given symbolic indication of their importance. The House of the Tiles at Lerna and the Tiryns Rundbau are impressive only for their size (although the predecessor of the House of the Tiles, building BG, had a splendidly ornamented clay hearth (pl. 20, 3). The central buildings at Troy II are most notable for the movable objects found in them, not for decorative or architectural distinction. And the complex structures at Vasiliki or Myrtos (Phournou Koriphi) in Crete are not visually impressive. The authority and status of the early bronze age chiefs was symbolised rather in his possessions—arms and plate—and in his burial. Not until the emergence of the principality in middle bronze age Crete is the seat of government and the house of the ruler laid out, constructed and decorated in a manner eloquently expressing these functions.

Technology for the Unknown

All human cultures create and sustain a system of beliefs which make intelligible to us those forces and events which seem totally outside of human power. Sun, moon and seasons, rain, drought and fertility, birth, death and misery are all themselves gods or else the gifts and attributes of gods. In order to bear the insistent reality of these forces, man tames them at least a little by naming them. By personification they become intelligible in human terms: the thunder of the storm is a manifestation of Zeus's anger, the earthquake is sent by Poseidon the Earth Shaker. And the mysteries within human life become in some way comprehensible or at least bearable by the same process of projection. Sickness and death may be less frighteningly unique events if related to the experience of others, as another direct hit for the death-dealing darts of Apollo.

Of the actual beliefs of the prehistoric Aegean, the myths through which the present world and its creation were made intelligible, we can know little. We can, of course, look backwards to that time, through the eyes of the classical world, encouraged by the recognition in the Linear B tablets of divine personages bearing names like those of the Greek gods and heroes. But to recognise the Greek deity in his Mycenaean predecessor merely impedes our understanding of the evolution of the concept.

In all human communities a knowledge of this irrational world of superhuman powers is accompanied by specialised techniques for influencing these powers. Highly specialised procedures will secure the attention, sometimes even the material presence, of the spirit or the god, and divine intervention or intercession may be obtained.

Sometimes the cosmology of the society is a more complex one, and the interior causal mechanism of events much more complicated than the informal interplay of di-

vine wills, with all its very human idiosyncrasy, with which Homer depicted the Greek pantheon. In such a case the world order is not to be influenced merely by the simple agency of a decent and proper respect, the avoidance of impiety, and an occasional libation. The Chinese, and the early Mexicans, in their different ways had a more complex notion of the world order, and more exacting techniques for keeping the world in its right course and for inclining Nature to benevolence towards man. In China, the year's prosperity depended on the correct performance of sacred contests at seasonal feasts: without their proper accomplishment the crops would not ripen. The Aztecs sacrificed hundreds of human victims to sustain the sun in its arduous course.

While we can know little of the precise dogma of prehistoric religion, the activities which were used to propitiate the forces of the unknown leave very clear traces. Many prehistoric societies evidently devised an elaborate and expensive technology to safeguard the position of society in the world, and another related technology to facilitate the auspicious departure of the deceased. And even after his journey 'to the other side', observances and precautions perhaps helped either to ensure his welfare there (as, for example, the masses for the soul of the departed in the medieval chantry chapel) or to prevent his maleficent return.

TECHNOLOGY FOR THE LIVING

The religion of the late bronze age Minoans has been documented by a series of finds from shrines within the palaces, and at holy places within caves and on the summit of mountain peaks in Crete. The representations on seal stones and rings and elsewhere add to this picture, and make possible the identification of a number of recurring religious symbols and deities.

Curiously, however, the cult figures from Crete are all small in size, and very few representations of gods or goddesses have been found amongst the many votive figurines. This is in contrast to the recent finds at Aghia Irini in Kea of a small 'temple' with large, more than half life-size, terracotta figurines. We cannot assume that the religions of the Minoan and Mycenaean civilisations were very closely similar. Certainly the wealth of reference in the art of Crete to religious symbols—horns of consecration, double axes, etc.—is less notable in the Mycenaean world.

In neither civilisation—and certainly this is true also to the Cyclades—did the religious beliefs and observances find monumental expression. In contrast to the religions of some of the great civilisations, those of Crete and Mycenae seem very domestic in character. The palace shrines seem insignificant little rooms, tucked away like the Shrine of the Double Axes at Knossos. The cult figures recently discovered at Mycenae had no magnificent architectural setting, and even at Aghia Irini in Kea the 'temple' is impressive only for its contents.

The almost subsidiary position of these domestic shrines is brought out by the impressive proportions of the Mycenaean megaron hall, with its hearth, and by the ample dimensions of the great courts of the Minoan palaces. The central court may of course

have been the scene of religious ritual, but the most exciting and dramatic events likely to have occurred there were the bull sports. As Nilsson (1950, 374) observes, 'It is often assumed that Minoan bull-fighting was a sacral performance, but there is nothing in the Minoan monuments to prove that it was more than a very popular secular sport.' The only locations devoted entirely to religious observance seem to have been the 'peak sanctuaries', and the numerous sacred caves. Indeed, nothing in Minoan-Mycenaean civilisation conveys the same intensity of religious expressions as the shrines of neolithic Çatal Hüyük.

The deities of the Minoan religion—notably the snake goddess and the Mistress of Animals—have been identified by Nilsson in his admirable analysis. He follows Sir Arthur Evans in recognising the veneration of sacred trees or pillars, and the symbolic significance of the horns of consecration and the double axe. Birds are seen to indicate the epiphany of the deity. Some of these beliefs and symbols seem to have had an origin in Early Minoan times.

Unfortunately no shrines of Early Minoan date have been recognised—unless the incomplete circular edifice at Myrtos. So the only way of establishing the religious significance of early bronze age objects is by comparison with those of the late bronze age, or by their funerary context, or, less reliably, by the absence of other plausible explanations for their use.

For this reason the evidence for early bronze age religion in the Aegean is limited. And yet despite this there are indications of possible origins for many of the symbols and conventions of later periods. Indeed it was during the early bronze age that most of the forms of the late bronze age—the horns of consecration, the double axe—made their appearance.

SYMBOLS

The religious significance of the bird, so well argued by Nilsson, is foreshadowed in a splendid dish of the Cycladic early bronze age, probably from Keros (Doumas 1969, 172). It contains a row of sixteen birds, all cut from a single block of marble (pl. 24, 1). The existence of other such dishes is suggested by further finds. This bowl has been aptly compared to a pottery bowl from Palaikastro with a bird modelled at the interior. The various finds of bird beads and bird pendants of stone (Tsountas 1898, pl. VIII, 16, 17 and 23; Seager 1912, fig. 20, IV, 7) may of course be without religious significance, yet the very large size of this dish (41 cm in diameter) and the severity of the composition imply a high seriousness of purpose in its manufacture.

The double axe, the most frequent of the Minoan religious symbols, is seen in miniature at Mochlos. The Early Minoan Tomb II yielded a copper example and two in lead (Seager 1912, 36 and fig. 12). The same cemetery also yielded a terracotta object (*ibid.*, fig. 48.31; see also Branigan 1969b, 32), identifiable as 'horns of consecration'. That this object may have served a useful function, such as that of pot support (Diamant and Rutter 1969, 147), does not diminish its significance as a prototype for the later cult symbol.

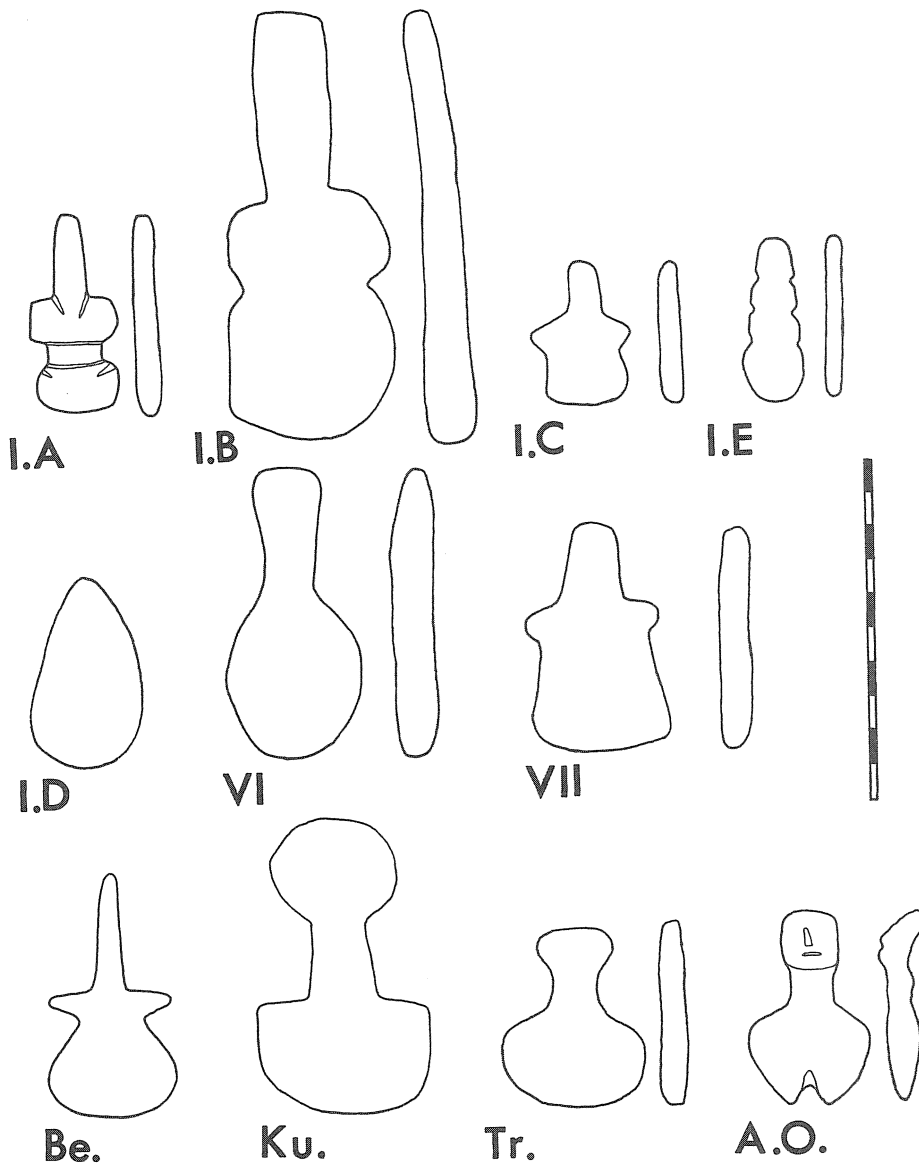


FIG. 19.4 Schematic marble figurines of the Aegean early bronze age. IA to IE, of the Grotta-Pelos culture; VI, Apeiranthos type of the Keros-Syros culture; VII, Phylakopi I type of the Phylakopi I culture; Be, Beycesultan type; Ku, Kusura type; Tr, Troy type; A.O, Aghios Onouphrios type. Scale in cm.

Very evident symbolism appears also in the Cyclades, upon objects of a possibly ritual function. It is documented in several instances and differs markedly from that of Crete. The 'frying pans' from Cycladic graves have long been a subject for dispute, and their use is entirely uncertain. Their typology is discussed in Appendix 2, and the dis-

tribution is seen in fig. 11.7. They may conceivably have served as mirrors (when filled with water), or simply as dishes, perhaps to make libations. Possible counterparts in metal are seen in the Troad and at Alaca Hüyük (Bittel 1959; Mellink 1956). In any case, they undoubtedly embody identifiable symbols in their decoration. Both the Kampos type (pl. 4, 1; Zervos 1957, figs. 224–27) and the mainland type (Mylonas 1959, fig. 148) typically have a circular symmetry in the decoration. A central rayed disc is enclosed by one or two concentric circles, themselves composed of running spirals or linked concentric circles.

The Syros type sometimes has this star (Zervos 1957, fig. 210) greatly enlarged, although without the surrounding concentric circles (*ibid.*, fig. 211; fig. 205 has the rays of the star near the perimeter, enclosing the field of spirals). More often, however, the whole central field of the Syros type is occupied by a lattice of concentric circles or spirals linked by lines to five or six neighbours (pl. 7, 1).

All the Syros pans depart from the circular shape, being elongated towards the handle. And nearly all of them, whether with disc, or spirals, or a combination of both, have an incised indication of the female pubic triangle in the exergue formed by this elongation. This symbol occurs so often, and compares so closely with the pudenda of the Cycladic marble figurines, that no other identification seems possible.

The field of spirals represents the sea, as the ships incised in it graphically indicate (pl. 29, 1), and the design is indeed very evocative of the glittering, multi-faceted surface of 'La mer, la mer toujours recommencée'. This identification of the circles, formed of linked spirals, seen on the Kampos-type pans is supported by the fishes swimming amongst them, seen in the pyxis lid from the Louros grave (Zervos 1957, fig. 228).

The central rayed-disc may reasonably be identified as the sun. On the Louros pan it could hardly be a star. The same symbol occurs on the diadem from Syros, flanked by animals behind which it appears again (fig. 18.1). Possibly it is actually drawn by them across the sky, like the bronze age sun-cart from Trundholm in Denmark (Klindt-Jensen 1957, pl. 36). Outside these two outer sun discs are adorants with arms raised. This interest in the sun is not seen later in the Cyclades nor was the sun the object of a cult in Crete (Nilsson 1950, 413).

The significance of symbols in this context is not clear; nor do we know why sun, sea and the female sex should be linked in this way. Its importance for us is simply that in the Early Bronze 2 period of the Cyclades an implicit religious symbolism emerges for the first time, even more clearly than in Crete.

This point is documented yet more convincingly by the Cycladic folded-arm figurines, which form a very clear and narrowly defined type. Always the arms are folded, usually right below left, always the figure is naked (except for a penis sheath and baldric on the few male figures). The nose is indicated in a standardised way by a raised ridge; few other features are shown in relief, and all share the same simplicity of style.

In the early neolithic, the standing figurine of clay already constitutes a type, and in the late neolithic the seated marble figurine with crossed legs is seen in several areas. The Plastiras and Louros types of the Grotta-Pelos culture are as closely defined in

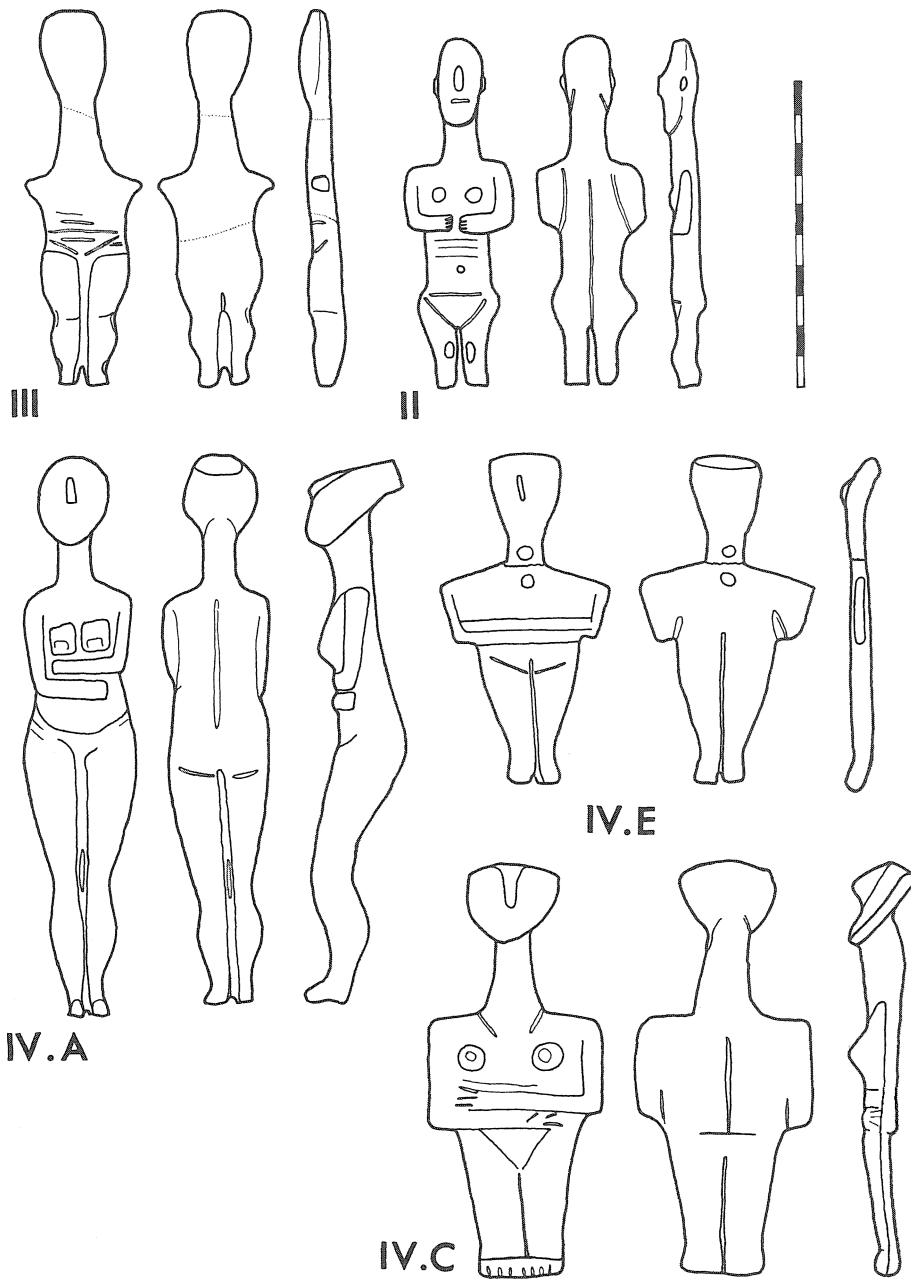


FIG. 19.5 Varieties of the Cycladic folded-arm figurine and its precursors. II, Plastiras type; III, Louros type; IV.A, Kapsala variety; IV.C, Chalandriani variety; IV.E, Koumasa variety. Scale in cm.

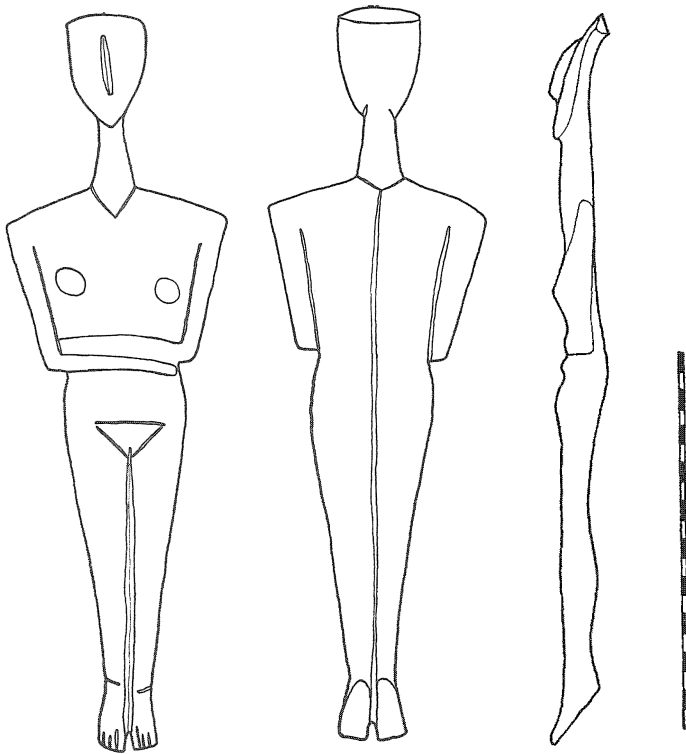
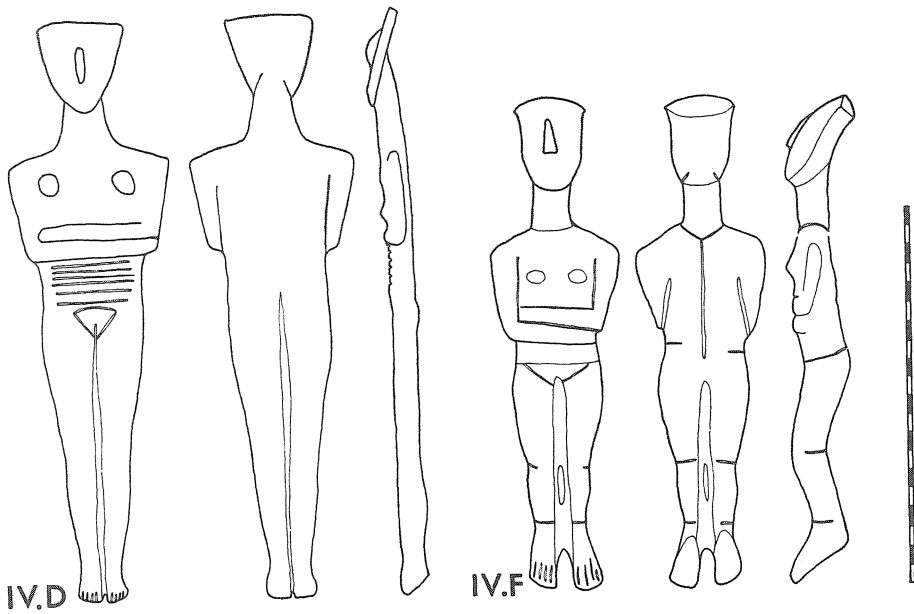


FIG. 19.6 Further varieties of the folded-arm figurine. IVB, Dokathismata variety; IVD, Kea variety; IVF, Spedos variety. Scale in cm.

IV.B



IV.D

IV.F

their form, but much more restricted in distribution. The Cycladic folded-arm figurine again conforms strictly to convention, and is more widespread in its distribution in the southern Aegean (figs. 19.5–19.7). It represents a significant new departure in the iconography of the Aegean. Its popularity was so great that in Crete it was actually copied, both by skilled craftsmen producing the Koumasa type, and by rather clumsy imitators, whose poor efforts occur in the Teke find (Renfrew 1969a).

The original meaning of these sculptures cannot be reconstructed with certainty. Although they are preserved mostly in burials, finds have occurred in settlements also—at Aghia Irini in Kea and at Phylakopi in Melos. Several examples, broken in antiquity and carefully repaired, indicate that they were not all specially made for burial, but used also by the living. Christos Doumas has argued persuasively (1969, 81 f.) that they were frequently buried simply because they were personal and cherished possessions of the deceased, and laid to rest with him.

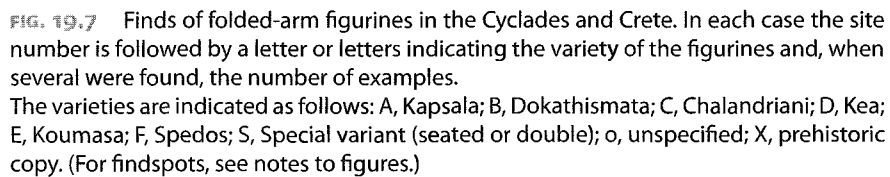
Assuming their serious religious significance—and they can hardly be regarded as toys—they may be seen either as goddesses, actual representations of the deity, or as votaries, like so many of the figurines of the later Minoan culture. One clue is given by the series of variants on this theme—seated figurines and double figures—carved in the same style.¹ The beautiful musicians from Keros are not deities, whether or not they were votaries (pl. 27, 1 and 2). And the charming seated figure offering a cup, in the collection of Mrs N. P. Goulandris (frontispiece), in its manner strongly suggests a worshipper.

The monumental size of some of these sculptures certainly does not exclude their being votaries—like the *kouroi* and *korai* of archaic Greek times. Perhaps, as in the case of the *kouroi* to Apollo and the *korai* to Athena, these votaries were in the likeness of the deity. The distinction between votive statue and cult image is not a clear one. Certainly the cult images of Late Minoan Crete were physically so unimpressive that they may not have inspired veneration in themselves, and may rather have been votive offerings to the goddess in her own likeness. In any case the creation of these impressive marble sculptures was more than a major artistic achievement: it was a consummate expression of a religious concept, a new and effective projection, influential in mainland Greece and Crete as well as in the Cyclades (pl. 31).

REGIONAL VARIATION

The individuality of the different regions of the Early Bronze 2 Aegean is well exemplified by the variety in the figurines. The Cyclades had two forms: the folded-arm figurine (with its own variants: pl. 30) and the schematic figurine of Apeiranthos type (Renfrew 1969a, 14). In west Anatolia, the schematic marble figurines of Troy, Beycesultan and Kusura type (fig. 19.4) may have survived, but western Anatolia gives very little indication of religious symbolism.

¹ For a discussion of all these forms see Renfrew 1969a, and for excellent photographs Zervos 1957.



Mainland Greece has yielded several folded-arm figurines, doubtless of Cycladic manufacture, and imitations and hybrid forms are seen at Aghios Kosmas. The only recognisable local type is the clay cone figurine (Blegen 1928, 187, fig. 177).

Crete had its folded-arm figurines, both imported and made locally (pl. 30, 3, 4 and 6). Among the possible imports is a dignified seated little figurine from Teke (Renfrew 1969a, pl. 9, a), while a double figurine in steatite from the same find perhaps imitates those now seen at Keros (Renfrew 1969a, pl. 9, b; Zapheirpoulou 1968b). It is of local work. Like the Cyclades and western Anatolia, Crete has its own schematic form in marble: the Aghios Onouphrios type (fig. 19.4). In addition, besides some very crude stone shapes at Pyrgos, there were rather simple, somewhat cylindrical figurines from Aghia Triadha, Trapeza (Pendlebury, Pendlebury and Money-Coutts 1936, pl. 18) and other sites.

Perhaps more interesting, however, as foreshadowing the terracotta bell-shaped figurines of Late Minoan times, are the anthropomorphic pottery figurines. They are small and plump. The example from Myrtos, like a later one from Koumasa (Warren 1969c, no. 1; Xanthoudides 1924, pl. II, 41 37) and other examples, carries a jug. The Myrtos figure is exceptional for the long neck, which does indeed give it a bell-like appearance. Another, from Mochlos, has the hands immediately below the breasts (fig. 19.8; Seager 1912, fig. 34). An interesting feature of one of the Koumasa examples is that the goddess, if such she be, has a snake around her neck.

RITUAL

No clear indications of specific rituals emerge at this time. Possibly the magnificently decorated hearth in Building BG, below the House of the Tiles at Lerna (pl. 20.3), the ancestor of the megaron hearth of the Mycenaean period, may have been used in some ceremonial way—but this is merely a possibility. Already, however, some of the sacred caves of Crete were revered—Arkalochori, with its dagger offerings, and Kamares perhaps, with its pottery gifts.

Only one class of object has been found whose ritual use seems well-established: the multiple vessel or *kernos* (pl. 11, 1). The complex circular arrangement of the example illustrated is known only from the tombs at Phylakopi in Melos. A simpler and perhaps earlier form there (pl. 11, 2) compares with a find from Koumasa in Crete (pl. 11, 3). Nilsson (1950, 137) and others have compared these with the multiple vases from Pyrgos, as well as with later bronze age successors. The stone 'salt and pepper' bowls have been mentioned in this connection. A striking indication of continuity is demonstrated by the offering table from Myrtos (Warren 1969c, 27 no. 8; see also pl. 26, 1 from Naxos). It finds a direct, although more finely fashioned successor at the Palace of Mallia (Marinatos and Hirmer 1960, pl. 56).

These scattered indications effectively demonstrate that at least in the Cyclades, and in Crete, a formal religious symbolism developed during the early bronze age. Moreover, the different regions had their own beliefs; the Cretan double axe and horns of consecration are not seen in the Cyclades, nor the sun, sea and sex symbolism in Early Minoan Crete. The megaron hearth is a specifically mainland feature. And yet at the same time

the symbolic significance of birds, and the widespread presence of the Cycladic folded-arm figurine indicate a community of outlook, anticipated by the finds of seated, cross-legged figurines in the neolithic of Crete, the Cyclades and the mainland.

Branigan (1969b) has gathered together the Early Minoan indications which foreshadow the cult of the Snake (or Household) Goddess of Middle and Late Minoan times. He argues persuasively that the various rather separate symbols, indications of only loosely related beliefs in Early Minoan times, were consolidated during the Middle Minoan I period into the cult of the Snake Goddess. He relates this syncretistic union with the appearance of the peak sanctuaries in the Middle Minoan Ia period.

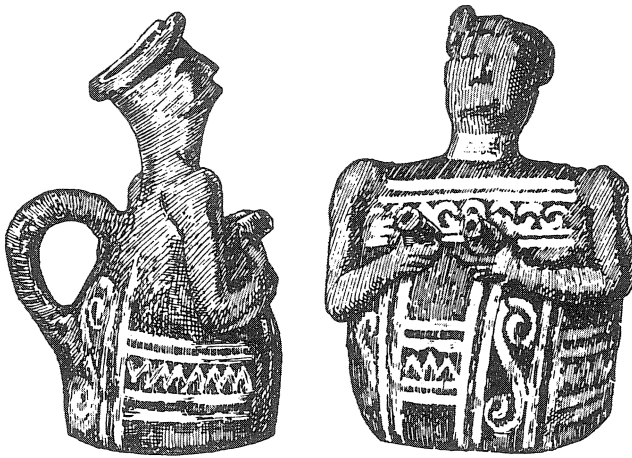


FIG. 19.8 Pottery vase in the form of a woman with hands supporting the breasts, decorated with white paint. From tomb XIII at Mochlos (after Seager). Height 19 cm.

It may be that analogous developments occurred in the mainland and perhaps in the Cyclades. For while the late bronze age shrine of Mycenae (with its snake) and of Aghia Irini (with its bare-breasted women) might appear to reflect aspects of Minoan religion, the Cretan idols themselves are not as impressive as these. Nor is the full complexity of the Cretan symbolism found outside of Crete.

The early bronze age societies of the Aegean evolved their own religious apparatus to cope with the supernatural world. And it was not until the partial fusion of traditions in the Minoan-Mycenaean civilisation in the late bronze age that the Minoan and Mycenaean religions can be regarded as one complex and sophisticated system of beliefs. Underlying this—just as in classical Greek religion—was the earlier variety of deities and symbols, a palimpsest of beliefs which was never quite unified, and which never lost its regional variety.

TECHNOLOGY FOR THE DEAD

Burial in the Aegean neolithic was an uncomplicated business. The simple disposal of the dead by inhumation, inside or outside the dwelling, sometimes with one or two

very simple objects, was the universal practice. It is seen in the numerous burials at early neolithic Nea Nikomedeia, and in pre-neolithic times at the Franchthi Cave.

In the final neolithic the concept of the cemetery, an area outside the settlement specifically set aside for the burial of the dead, was formulated in several regions of Greece. It had, of course, been anticipated by several millennia in the Natufian culture of Palestine, and by at least a thousand years by the people of the *Linearbandkeramik* (Danubian I) culture. Moreover, the long barrows of Britain and north Europe, and the megalithic tombs of western Europe had been in use several centuries before the cemeteries at Souphli and Kephala were founded. The notion that monumental burial, or collective burial, or indeed burial of any kind, reached the western Mediterranean from the Aegean is entirely without foundation.

The earliest cemetery yet recorded in the Aegean is the urnfield at Souphli in Thessaly (Biesantz 1959). This is altogether exceptional for the neolithic or early bronze age of Greece in that the dead were apparently cremated (no specialist report is yet available for the remains), and the ashes placed in 'middle-sized' urns, sometimes accompanied by one or two additional smaller pots. The pottery is ascribed to the Larissa culture. No other cemeteries are known at present from neolithic or early bronze age Thessaly, and the practice of urn burial is not seen elsewhere in the Aegean before the middle bronze age.

The Cycladic island of Kea preserves at Kephala the first built graves of the Aegean. There, as described in chapter 5, cists either circular or rectangular in plan were constructed of small stones and surmounted by a platform of flat stones. Each contained several burials. Child burials in pithoi were also found.

The earliest rock-cut tomb yet discovered is in Attica, in the Athens Agora. Contemporary with the Kephala culture it was a shaft grave with a chamber at the bottom (fig. 7.6).

In Crete at this time the practice of burial in caves may have begun, although it is not easy to distinguish burial deposits from the purely domestic debris resulting from occupation by the living. The neolithic finds at Koumarospelio, Trapeza and the Eileithyia Cave are all of this kind, and careful excavation is needed before one can be certain of cave burial in Crete during the final neolithic period.

Already then, by the onset of the early bronze age, several features are seen which establish the pattern of burial throughout the prehistoric period in the Aegean. There is an absence of monumentality—the Aegean does not boast megaliths like those of western Europe, and the splendid *tholoi* of the late bronze age were built only in the later phases of Aegean civilisation. Moreover, until the late bronze age, there is a wide variety in custom between the different regions.

In the early bronze age the local evolutions continue. The Kephala graves are succeeded by the cist cemeteries of the Grotta-Pelos culture (pl. 25, 1; fig. 19.9) and by the built graves of the Keros-Syros culture (pl. 25, 2; fig. 19.10). Burial of one or a very few dead in cist graves is seen also at Iasos on the west Anatolian coast, and in Attica (see chapters 7 and 11) and Euboia (fig. 11.5). It prevailed, to become the main funerary form of Middle Helladic Greece.

In Crete a different tradition, of communal burial, developed. In the Early Minoan I period, and perhaps before, a settlement's dead might be buried in a cave or rock shelter such as Pyrgos or Kanli Kastelli. At that time, as discussed in chapter 6, the idea emerged of a built tomb to fulfil the same purpose. The round tombs of the Mesara Plain (pl. 25, 3; fig. 19.11), and the rectangular 'ossuaries' most frequent in east Crete are expressions of the same idea. Hutchinson (1962, 228) suggested that the dead in eastern Crete may first have been buried separately, and their bones later transferred to the ossuary, although it is possible that the dead man was laid to rest directly among the

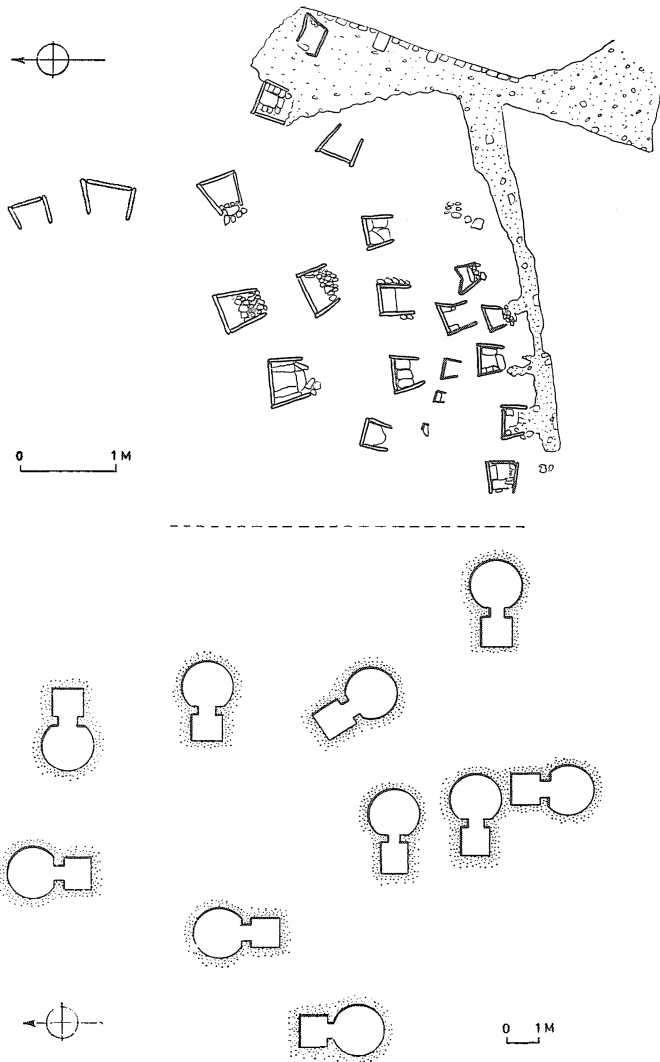


FIG. 19.9 Cemeteries of the third millennium. (Above) Aghioi Anargyroi in Naxos (after Doulas); (below) tomb group 2 at Manika in Euboea.

bones of his ancestors. Mylonas (1959, 118) has carefully considered the evidence from the multiple burials in the cist graves of Aghios Kosmas in Attica, and concludes that there, as on occasion in the Cyclades (Bent 1884, 42–59), the body was in some cases left outside the grave to decompose, before the bones were gathered together and set inside the grave. His arguments are persuasive, and this process of excarnation may have been practised in Crete also.

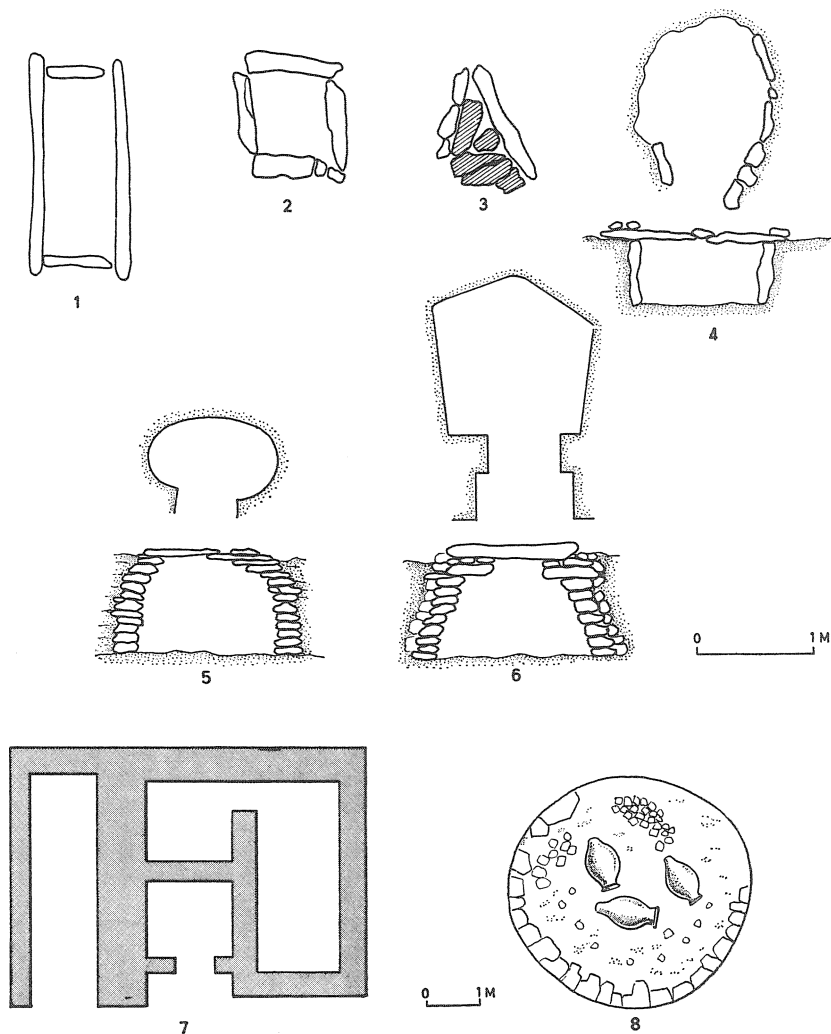


FIG. 19.10 Built graves of the third millennium BC.

1, lasos grave 3; 2 and 3, Orecheion Kalogries (Melos) graves 9 and 2; 4, Aghios Kosmas grave 8; 5, Chalandriani; 6, Chalandriani grave 345; 7, Mochlos tombs IV, V and VI; 8, Steno (Levkas), grave R 15.

In Crete, two or three round tombs are often found together, and this has suggested to some writers a tribal or clan structure in the society, although at Mochlos they are so numerous as to suggest family vaults. Yet the nearly two hundred burials found at Archanes exceed the total likely in a family tomb. The suggestion of some sort of clan-like division has been made also for the Cycladic cemeteries, and especially for Chalandriani in Syros, where the single graves are clustered together in separate groups (see chapter 18).

In mainland Greece also there was a variety of customs. In Levkas the deceased with his possessions was partly burnt on a funeral pyre on a circular stone-built platform up to 9 m in diameter, and the remains transferred to a pithos. This was buried in the centre of the platform which was then covered by a tumulus (figs. 19.11 and 18.2). Elsewhere cremation was not practised during the early bronze age, and the partially burnt bones found in the Trapeza Cave in Crete, and in some of the round tombs, are thought to be the result of later burning, and perhaps the fumigation of the burial place. Late in the early bronze age, cemeteries of rock-cut tombs are seen. At Manika in Euboea (fig. 7.6, 1 and 2) each grave was entered by means of a small shaft, while at Phylakopi in Melos (fig. 7.6, 3 to 6) the tomb was often cut into the hillside and entered from the front. A rock-cut tomb of the Korakou culture at Corinth suggests that there may be a continuity of tradition here from the final neolithic.

In Crete towards the end of the early bronze age there is an important development away from the altogether communal pattern of the earlier period. Individual clay coffins or *larnakes* are now found inside the communal tombs—as at Pyrgos for instance—and pithos burial is now seen.

No clear pattern emerges from this multiplicity of customs, other than the preference for communal burial in the Early Minoan culture. The tomb forms of the early bronze age clearly inspired those of later periods. Cist cemeteries are found in Middle Helladic Greece, evolving perhaps to the shaft graves of the late bronze age. Family rock-cut tombs became the most popular form in Crete as in Mycenaean Greece. In Crete the communal burial in round tombs continued—Kamilari II and the tomb at Gypsades were actually built in Middle Minoan II times. But the most significant new advance was the emergence of the roofed, built tomb or *tholos*, seen in the western Peloponnese at the close of the middle bronze age (Hood 1960; Branigan 1970b, 156). This may possibly be a development, architecturally, of the Minoan round tomb tradition, but burial, as was usually the case outside of Crete, was multiple rather than collective. This soon became the principal burial form for chiefs or princes, and the distribution of *tholos* tombs in the late bronze age marks effectively the extent of Minoan-Mycenaean civilisation (fig. 4.2).

The evolution in tomb form was accompanied by an increase in the wealth and quality of the grave goods. From the early bronze age onwards it seems that the deceased's most precious possessions were buried with him—his weapons, his jewellery, his drinking cup and wine equipment. Very few, if any, objects seem to have been made specially for the grave: the Early Cycladic figurines and marble objects often show signs of repair,

clear indications that they were used in daily life. The same may indeed be true of the *kernos* vessels of Phylakopi, and the special Early Minoan stone vessels. Not until the Shaft Graves of Mycenae, with their golden 'death masks', the rather ineffectual gold scales and the little suit of child's armour in gold, do we find objects possibly made with burial in mind. And even here the presumably symbolic significance of these things may have had a relevance for the living prince as well as for the dead one.

The Aegean technology for the dead does not seem to have been unduly elaborate, or particularly costly. Every community of the early bronze age set aside a special precinct for the inhumation of the dead man, who was buried together with his possessions in decent care. Not until the late bronze age is there notable ostentation, as in the architecture of the *tholos* tombs at Mycenae or Orchomenos (pl. 29, 2), and the Royal Tomb at Isopata in Crete. Burial did not normally involve animal sacrifice,² and never the human sacrifice seen in the royal graves of early Egypt and Mesopotamia.

There is just a little evidence to suggest that the dead were revered or remembered after the burial—for a 'cult of the dead'. This would imply some belief in the survival of the dead, but not necessarily in any more vital form than the dim shades of the classical Greeks. Christos Doumas has described how the cemetery of Aghioi Anargyroi in Naxos was enclosed by walls to south and east (fig. 19.9), and several curious hat-shaped vessels were found (Doumas 1962, 273 and pl. 333), which may have been used in some way on occasions other than the actual burial of the dead. Branigan (1970b, 102), in his full and careful consideration of the Mesara *tholoi* concluded that there was no evidence for ritual observances other than at the time of burial, and hence no clear indication of belief in an after-life. The little rectangular chambers outside the *tholoi* (fig. 19.11) are best regarded as ossuaries. The many cups and jars found may have been used by the mourners to drink 'toasts', and the animal vases to pour libations for the dead. In some cases a funeral meal was probably eaten. The paved courts seen at some of the *tholoi*, and most clearly at Koumasa (Branigan 1970b, 133), could conceivably, as Branigan suggests, have been used for ritual dances, but not necessarily in connection with a cult of the dead.

Similar conclusions emerge from the material excavated at the cemetery of Aghios Kosmas in Attica. Mylonas (1959, 118) has fully documented that grave goods are frequently found outside the graves, but concludes on plausible grounds that they were set there at the time of burial.

There is no persuasive evidence for a belief in after-life anywhere in the Aegean. Very possibly the heavy slab covers on some Cycladic graves—already seen at Kephala—may have been intended to keep the dead from rising, just as the heavy stones at the doorway to some of the Mesara *tholoi*. The position of the knees, up towards the chest in a crouched position, suggest that some of the Cycladic corpses may have been tied, and a possible motive again would be to prevent the dead from waking. There is no necessary contradiction here: fear of the dead does not necessarily imply a belief in immortal-

2 The horse burial at Marathon (Vermeule 1964a, 298 and pl. XLVII) is an exception.

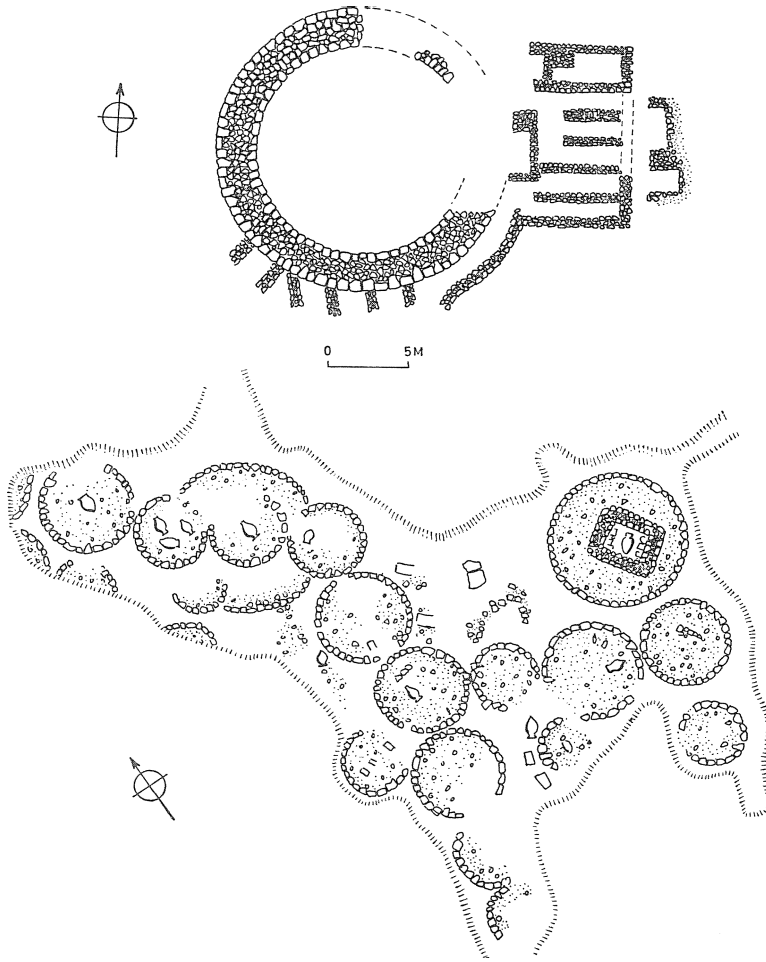


FIG. 19.11 Cemeteries of the third millennium BC. (Above) *tholos* tomb A at Platanos in the Mesara Plain, Crete; (below) the 'R Graves' at Steno in the Plain of Nidri, Levkas.

ity. Nor do the finds from the late bronze age Aegean demand a different conclusion. Numerous cups and other broken vessels in the *dromoi* of Mycenaean tombs suggest the likelihood of libations and funeral feasting, but not on occasions subsequent to the burials. Hero cults, documented by Nilsson, involved the veneration of specific heroic figures receiving some of the honours accorded to minor deities: this is not the same thing at all as a cult of the dead.

The identification of the actual religious beliefs and customs involved in burial in the Aegean early bronze age is more difficult (cf. Ucko 1969), if not impossible. Nothing is gained by over-simplifying, by lumping all religious and funerary observances together as directed towards a single 'Great Earth Mother'. As Nilsson (1950, 391) remarks: 'We must have due regard to the differences between the deities, and not obliterate them.'

This brief summary shows that the observances for the dead were neither very complicated—so far as the archaeological remains show—nor very expensive. The Cycladic cist graves might have taken a couple of men a day to construct. The built graves of Crete took considerably longer, but they contained numerous individuals. Rock-cut tombs probably required proportionately more work, but in general the graves of the early bronze age represent a labour equivalent of little more than a total of a man-week for each occupant. It was the fusion of the Cretan practice of building large stone tombs with the mainland and the Cycladic one of burying only two or three people in each, which yielded the prodigiously expensive construction of the late bronze age *tholos* tombs. They must have occupied a team of men for some weeks or months, and yet were occupied by very few individuals.

The overwhelming archaeological significance of burial in the Aegean area arises from the custom of burying many of the deceased's most prized possessions with him. Many of archaeology's richest finds are objects thus consigned to 'the silent earth'. It is we, not they, who attach such importance to these burials. Until the great *tholos* vaults of the late bronze age the prehistoric Aegean cemetery was probably much like the Greek village cemetery today: respected, hallowed indeed, yet modest and left chiefly to the dead.

Projections for Pleasure: Beauty, Style and Play

The importance to all men in all cultures of play and playing was emphasised by Huizinga (1949, 173) who viewed civilisation *sub specie ludi*: 'Civilisation is, in its earliest stages, played. It does not come *from* play, like a baby detaching itself from the womb: it arises *in* and *as* play, and never leaves it.' Certainly the culture-historian must take seriously a whole range of activities, neither evidently productive in themselves (in the sense of fulfilling primary needs), nor of obvious religious significance. Play can be a serious matter. All these projections—the art-work, music, the patterns of dance and game—often seem to give symbolic form to pleasure itself: pleasure reified.

Song, dance and play leave hardly an echo in the archaeological record. But at least the Harvester Vase (pl. 27, 3) gives us a most vivid glimpse of rural gaiety in the late bronze age, with musical background from the *sistrum*. More sophisticated evidence comes from delightful terracotta groups of dancers found near the *tholos* at Kamilari, and at Palaikastro (Marinatos and Hirmer 1960, pl. 132). The circular dance is still the most popular today in Greece, and in weddings of the Orthodox Church, the bride, the groom and the priest circulate in solemn dance around the altar. Many ancient Greek rituals and festivities also included dances, and it is safe to assume that people danced for pleasure, as well as in connection with religious celebrations, already in the early bronze age. Certainly the little Cycladic sculptures (pl. 27, 1 and 2) document delightfully that music was available—both from a stringed instrument whether lyre or kithara, and from the double pipes. A figurine without provenance, standing like the piper, is playing a syrinx (Cahn 1965, no. 28).

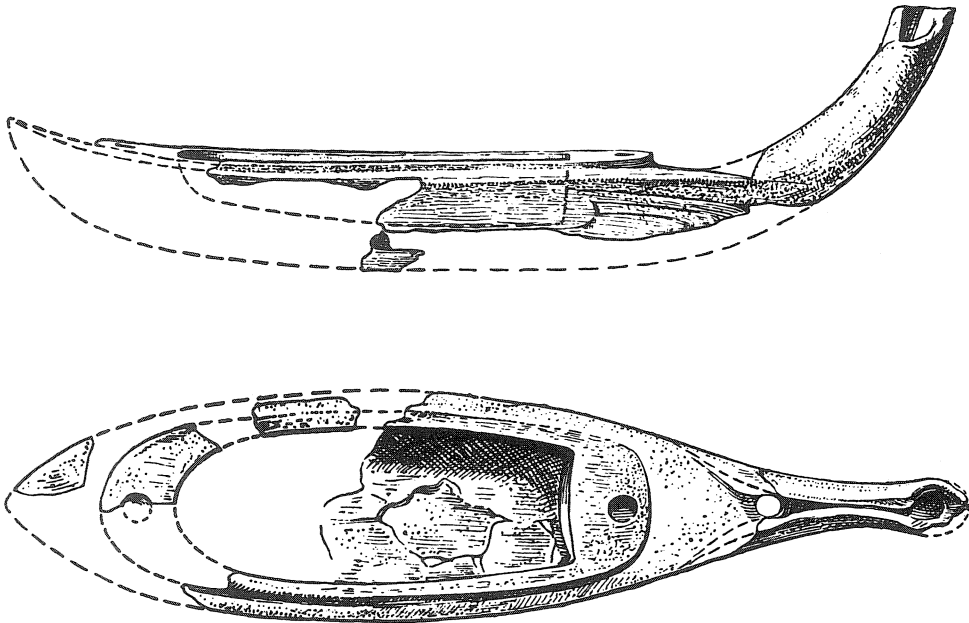


FIG. 19.12 The lyre: ivory sound box from Tomb 7 of the Late Minoan cemetery at Zapher Papoura (after Evans). Length 25 cm.

In late bronze age times there are several representations of the lyre, and a grave in the Zapher Papoura cemetery actually contained the ivory remains of one (fig. 19.12). Evidently the deceased was an accomplished player, and the notion that he was a professional minstrel is tempting. The gold ring and gold beads also found indicate his high standing in Minoan society at the end of the bronze age.

Royal play is indicated by a magnificent gaming board from Knossos (Evans 1921–35, III, frontispiece). Clearly too, in late bronze age times, and especially on the mainland, hunting was a popular occupation. Inlay work on Mycenaean daggers suggests that already it was the sport of princes.

The most famous of all Aegean sports was the Cretan bull-leaping. It is depicted in numerous scenes on gems and frescoes, in small sculptures and in bronzes. Graham has persuasively argued that it used to take place in the central courts of the palaces, doubtless before crowds, such as are seen in the miniature frescoes. Whether or not it had a religious origin and significance, which is not certain, these representations are entirely secular in flavour, expressing often the dramatic contrast in the anatomies of bull and leaper. The miniature frescoes also direct attention to the social aspects—the crowd, the setting—rather than focusing too intensely upon the central activity. No Early Minoan bull-leaping scenes have been preserved, but we have several theriomorphic vases, where the tiny figure of a man is grasping the horn of the bull. Examples come from

Koumasa and Porti, and the bull sometimes wears a kind of harness (Xanthoudides 1924, pl. II, 4126; pl. VII, 5052. For harness, *ibid.*, pl. VII, 5052; Seager 1912, fig. 29). Evidently the bull sport had an origin at least as far back as the early bronze age.

Inevitably evidence for music, dance and sport is scanty in the material record. But fortunately finds are sufficiently numerous to document the transformation, during the third and early second millennia BC, of the simple and rather crude artistic conventions of the Aegean neolithic to the sophisticated elegance of the Minoan-Mycenaean civilisation.

Works of art of the Aegean early bronze age are now so numerous that no survey can be complete. It is possible, however, by selecting a few themes, to indicate how rapidly the expressive powers of artists and craftsmen in the third millennium developed. The created visual environment now became the product of conscious design, especially in the palaces. Decoration, with the use of symbolism and of natural images, enjoyed a much wider potential range of meaning.

The forms of expression of the neolithic, at least those which have been preserved, were rather limited. Pottery generally had complete axial symmetry, and decoration, with a few exceptions during the early neolithic was restricted to linear ornament, whether painted (usually in monochrome), incised, or occasionally applied. Figurines were moulded from clay, and more rarely carved in stone. Stone and shell were used for simple beads and bracelets. Probably the most beautiful and carefully worked household objects were the few stone bowls which have been found from the middle neolithic onwards.

In the early bronze age the range of materials chosen by the craftsmen was greatly increased, and new materials became available. One of these was ivory, which was easily carved. Its availability in Crete (through import) facilitated the craft of the seal-maker. Of the new materials, by far the most important was metal. Weapons became, in some cases, works of art—there are silver daggers in Crete. Metal vessels made what must have been a dazzling impact (pl. 19). Indeed the four most striking novel ceramic forms of the time: the jug, the *depas* cup, the 'sauceboat' and the 'frying pan' had metal prototypes. So too may the Minoan 'teapot', in the form of a spouted can (Bittel 1959, 8). And metal jewellery offered an entirely new dimension for personal adornment and the display of wealth. Many of the metal types were discussed in chapter 16.

The availability of metal tools, and the growing fascination for visual expression, made possible the production of occasional monumental works in stone, seen in the Cyclades (pl. 31). While monumentality is rare in Aegean prehistoric art, major projects, such as the stelai of the Mycenaean Shaft Graves (fig. 18.7), or the lion relief of the Lion Gate, as well as the large terracotta figurines of late bronze age Kea, are foreshadowed by such works.

Red-painted plaster has been found at neolithic Phaistos, but evidence is at present lacking for the gradual evolution of Minoan fresco painting from a hypothetical use of decorated plaster in the early and middle bronze age. So at present it seems that the

technique of painting plaster was learnt, together with a number of motifs, from the Near East in the later bronze age.

The art of the early bronze age is impressive, however, not so much for the potential media of expression, but the use to which they are put. The abstract forms of vessels and containers are more imaginative and more stylish than their predecessors. Sculpture in the round, encouraged by the emergence of a whole range of specific types, becomes much more accomplished. And, above all, the decoration of surfaces develops from rather empty linear doodling through the creation of complex patterns of ingenious symmetry, to the emergence of a pictorial naturalism unrivalled in Europe since the cave paintings of the palaeolithic period.

Very strikingly, most of these changes are seen during the Early Bronze 2 period of the Aegean, save only the evolution to this 'naturalism', which is slower to develop. In the Aegean Early Bronze 1 period there is no overall development from the situation in the neolithic. The neolithic artistic range is exemplified, for example, in the varied linear ornament on the pottery at Saliagos (Evans and Renfrew 1968, figs. 31, 75 and 76), and the small carvings, both schematic and more anatomically detailed found there. The variety of forms in neolithic Thessaly, and especially at Sitagroi and Dikilitash in Macedonia, exceeds anything in Early Bronze 1.

Already, however, there are developments in Crete and the Cyclades which, in retrospect at least, are significant. The incised decoration of the Grotta-Pelos culture shows, at its best, a sensitive awareness of surface patterning (fig. 10.3; pl. 3, 1), and the footed jars and beakers of marble (pl. 1), have strikingly simple forms anticipating the elegance of the succeeding phases. Two new figurine forms, the Plastiras and Louros types, are seen. Both rigidly conform to type, the former with an eye for anatomical detail (fig. 19.5, II)—navel, kneecaps, ears—the latter (fig. 19.5, III) with an overriding sense of simplicity. In Crete the painted pottery, the earliest of the Aegean early bronze age, displays, as Branigan has sympathetically emphasised (1970a, 127), an artistry and an elegance quite foreign to the neolithic pottery of Crete.

Yet these are all simply modest heralds of the changes soon to come. In the Early Bronze 2 period, there suddenly emerges a wealth of vessel shapes in metal, of jewels and adornments. Their elegance is echoed in beautiful new forms in marble and clay. Stone vases are first made in Crete at this time, and sealstones make their appearance in the Aegean. Sophisticated linear patterns, linear symbols, and the first attempts at spatial arrangement are seen. Sculpture, especially in the Cyclades, achieves a consummate artistry never previously attained, and rarely since (pl. 32).

In the Early Bronze 3 period the explosive development, comparable in its modest way to that of Greece in the sixth century BC, of Florence in the fourteenth century or of Paris in the first two decades of the twentieth century, loses momentum. But the awareness is there that the world can effectively be depicted upon a surface, and not solely by modelling: the developments which lead to the vase and fresco painting of the close of the middle bronze age are already under way.

The inventiveness of the time is well seen in the animal forms—the Cycladic pottery bear (pl. 16, 2), and the marble quadrupeds (Zervos 1957, figs. 238 and 332; Doumas 1969, 78). In Crete it produces a whole series of sealstones carved into imaginative shapes—birds, monkeys, quadrupeds (fig. 6.7).

The fascination for linear pattern is well seen on the Lerna sealings (fig. 7.7) whose elaborate scrollwork occurs again on the interlocked spirals of the Cycladic stone vases (pl. 15, 1), as well as on Early Minoan seals. The fluid yet stationary pattern of elaborately interlocked circles and spirals on the Cycladic frying pans (pl. 29, 1), the ‘unending *rapport*’ as Matz has termed it, foreshadows the harmonious Mycenaean spirals, best seen on the carved roof of the Treasury of Minyas (pl. 29, 2). The love of movement so pervasive in Middle and Late Minoan Crete is only occasionally felt in the early bronze age, as in some of the seal motifs which show the ‘torsion’ of which Matz has also written (1928, 102). This is something which never takes hold in the mainland, where an unsmiling fixity controls the ceramic decoration, from the Korakou to the Tiryns culture, into Middle Helladic times and the Mycenaean period, and on to archaic Greek art.

Lack of movement need not imply lack of grace. Indeed the ‘sauceboats’ of Greece and the Cyclades, seen in gold, in pottery and in marble, are the most stylish of vessels (pl. 19, 3 and 4). The lightness, elegance and flowing lines of some of the marble vessels of the Keros-Syros culture (pl. 6, 1 and 2) merits comparison with Chinese porcelain. But such elegance is incompatible with elaborate surface decoration, such as embellishes the ‘Early Minoan III’ pottery of Crete, and with the informality of the mottled Vasiliki ware.

Ultimately the most significant development at this time was probably the representation of scenes on sealstones and elsewhere. The purely decorative repetition of animals (Kenna 1960, figs. 33 and 40; Matz 1928, pl. 1) is not the same thing as this new scenic composition, for the ‘free style’ as Branigan terms it (1970a, 139) shows separate objects related in a coherent picture space to form a single scene. This is seen again on the remarkable ivory seal-cylinder from Poliochni (pl. 23, 3; Brea 1957, fig. 1), apparently a battle scene which foreshadows the Mycenaean Siege Rhyton and the scenic decoration of the Katsamba ivory pyxis of the late bronze age. Some of the rock carvings of Naxos, which are persuasively dated by Doumas (1965; cf. Bardanis 1966) to this time, show groups of individuals in the same way.

Purely heraldic arrangement—something different again—is seen on the Chalandriani diadem (fig. 18.1, 1), and on a gold pin from Poliochni (pl. 18, 5).

The willingness to relate objects in a picture-space, so as to form a scene, is one of the implications of the term ‘naturalism’, so often applied to Minoan art. Another is the keen interest in the forms of plants and animals, represented in two dimensions. Already occasional fishes, humans and other forms occur on the painted pottery of Phylakopi I, and of ‘Early Minoan III’. Yet these forms are seen rather schematically until the sudden passionate awareness of nature which grips Crete and the Cyclades at the very end of the middle bronze age. Natural forms are first most vividly caught in the early bronze age in little plastic representations—in the gold flower from Mochlos

(fig. 6.8; Seager 1912, 72, fig. 42), the carved pyxis lid (fig. 6.6) from the same site, and above all in the beautiful pendant from Mallia (pl. 18, 4) dating to the beginning of the Middle Minoan period.

These may be the springs of naturalism, although this is a term to be used with caution (Groenewegen-Frankfort 1951, 196). But most early bronze age art in the Aegean was more abstract, more symbolical. As in the archaic art of many civilisations, the creation of recognisable and symbolic forms was already a sufficient achievement easy verisimilitude, relaxed and informal, was in the future.

Precisely this severe impression is conveyed by the Cycladic marble figurines. They are ambitious and often monumental in a way not seen in the neolithic period. They may well, with their painted decoration (pl. 32, 1), often have seemed realistic enough at the time. Yet they conform rigidly to type. And even within the framework of the folded-arm convention, the variation is much less free than one would first judge. As indicated in chapter 11, the type comprises a number of varieties, and most examples can be yet more rigorously classed (Renfrew 1969a). Mrs Patricia Preziosi has ingeniously suggested that these sub-varieties, of which she has detected several, are the creations of individual craftsmen and their immediate circle, and her further analysis of this idea promised to increase our understanding of Early Cycladic art. Even the delightful musicians (pl. 27) seem to conform to type. Undoubtedly this type had a meaning, so that the figurines were symbols for a specific, probably religious, belief. The figurines are stylish and immensely appealing to modern eyes, precisely by virtue of the highly simplified forms and lines. The suggestion, discussed above, that they were conceived on the basis of fixed canons of proportion is not implausible. It accords with the attention to formal regularity, to symmetrical pattern, which is seen in the early bronze age alongside the nascent naturalism of the much freer animal carvings.

This very brief survey of some of the themes in the third millennium art of the Aegean completes the consideration of the projective systems of the time. It reflects the development seen in several of them—the creation of a different order embodying new beliefs and activities, the abandonment of one set of rules and precepts (whether in art, religion or social conduct) for another, itself destined to be superseded by the further growth of the system. During the third millennium BC in the Aegean, man's view of the physical world evidently underwent significant changes, and alongside the new subsistence basis and the new technology, different social and projective systems emerged. The result of these developments in the various different dimensions of existence was the emergence of the complex society, the complex world, which we term civilisation.

Chapter 20

Trade, Communication and Innovation

Year	Country	Population (millions)	Urban population (millions)	Urban population (%)	Population density (per sq km)	Urban population density (per sq km)	Population growth rate (%)	Urban population growth rate (%)	Population doubling time (years)	Urban population doubling time (years)	Population pyramid	Urban population pyramid
1950	United States	150	100	67	30	100	1.2	1.2	58	58		
1950	France	45	30	67	200	200	0.8	0.8	87	87		
1950	Germany	50	35	70	230	230	0.7	0.7	100	100		
1950	Japan	80	50	63	330	330	0.6	0.6	117	117		
1950	Italy	45	30	67	200	200	0.8	0.8	87	87		
1950	Canada	25	15	60	30	100	1.2	1.2	58	58		
1950	United Kingdom	50	35	70	230	230	0.7	0.7	100	100		
1950	Sweden	10	7	70	230	230	0.7	0.7	100	100		
1950	Netherlands	15	10	67	300	300	0.6	0.6	117	117		
1950	Belgium	10	7	70	230	230	0.7	0.7	100	100		
1950	Switzerland	3	2	67	300	300	0.6	0.6	117	117		
1950	Australia	10	5	50	30	100	1.2	1.2	58	58		
1950	South Africa	10	5	50	30	100	1.2	1.2	58	58		
1950	India	360	100	28	150	100	1.2	1.2	58	58		
1950	China	550	100	18	150	100	1.2	1.2	58	58		
1950	USSR	160	100	63	80	100	1.2	1.2	58	58		
1950	Brazil	70	20	29	150	100	1.2	1.2	58	58		
1950	Argentina	20	10	50	30	100	1.2	1.2	58	58		
1950	Chile	7	3	43	30	100	1.2	1.2	58	58		
1950	Colombia	10	3	30	30	100	1.2	1.2	58	58		
1950	Venezuela	10	3	30	30	100	1.2	1.2	58	58		
1950	Peru	15	3	20	30	100	1.2	1.2	58	58		
1950	Ecuador	5	1	20	30	100	1.2	1.2	58	58		
1950	Bolivia	5	1	20	30	100	1.2	1.2	58	58		
1950	Paraguay	5	1	20	30	100	1.2	1.2	58	58		
1950	Uruguay	3	1	33	30	100	1.2	1.2	58	58		
1950	Costa Rica	1	0.5	50	30	100	1.2	1.2	58	58		
1950	Panama	1	0.5	50	30	100	1.2	1.2	58	58		
1950	Cuba	7	3	43	30	100	1.2	1.2	58	58		
1950	Haiti	5	1	20	30	100	1.2	1.2	58	58		
1950	Dominican Republic	2	0.5	25	30	100	1.2	1.2	58	58		
1950	Jamaica	1	0.5	50	30	100	1.2	1.2	58	58		
1950	Trinidad and Tobago	1	0.5	50	30	100	1.2	1.2	58	58		
1950	Guyana	0.5	0.2	40	30	100	1.2	1.2	58	58		
1950	Suriname	0.5	0.2	40	30	100	1.2	1.2	58	58		
1950	Guatemala	5	1	20	30	100	1.2	1.2	58			

Trade, among all the activities of a society, is the most likely to favour innovation and the acceptance of innovation. It implies, of course, exchange, and hence the possibility that by producing goods in excess of his wants a man can obtain other goods which he requires or desires. The increased production itself may favour efficiency and hence the ready acceptance of labour-saving innovations. The distribution of goods implies agreement between the producer and the recipient, and consequently a whole field of social contacts and organisations. Such contacts bring with them the opportunity for the exchange of ideas, and the acquisition of new techniques and beliefs. Finally the received goods themselves have an impact, suggesting new activities or new designs to copy. It is important to note too that not all the innovations promoted by trade originate outside the region in question—some arise locally and are adopted more readily in the new conditions which the trade has brought about. All these processes may be seen in action in the third millennium Aegean.

The trading subsystem of a culture is for this reason of particular interest when the growth of the culture is being studied. It serves at the same time both to link many activities within the system which were previously quite unrelated, and to open a channel between regions and cultures for the flow of ideas.

Trade here need not imply any professional trade or market commerce. It involves simply the peaceful transfer of goods, when he who gives receives something in return. Although such exchange does, in a sense, take place within every family, the term is not generally applied to transactions within single residence units, but rather to exchange on inter-family, inter-village or inter-regional scale.

It is documented in the archaeological record by two classes of evidence: materials which, because not available in the region of the findspot must inescapably have been imported, and artefacts whose form, while strange and unusual in the context of discovery, closely resembles that of finds in another region, from which they may have been imported. Only in very special cases do finds, such as seals or sealings, yield direct evidence for the actual mechanism of the trading system.

The documentation of prehistoric trade depends, therefore, upon the successful characterisation of the traded materials—the scientific determination of their provenance—or on the careful comparison of artefact forms to establish resemblances so close that they cannot be fortuitous. The difficulties of both approaches have, in the past, led to serious error. For example, the supposed characterisation of white-spotted obsidian found in Late Minoan Crete as ‘liparite’ led archaeologists to suggest a thriving obsidian trade between the Aegean and the west Mediterranean which proves to be illusory (Renfrew, Cann and Dixon 1965, 239). Another instance is the general tendency to regard all early marble objects in the east Mediterranean as originating from the Cycladic islands, where good marble sources are available. Supposed Cycladic exports to Egypt have been claimed on this ground alone. Again scientific analysis has shown these claims to be without foundation (Renfrew and Peacey 1968).

The too easy acceptance of ‘parallels’—similarities in form among objects of different provenance supposedly indicating community of origin—has led to still more serious errors. On the basis of real but often very general similarities—spirals in Malta, decorated pottery in Iberia, figurines in the Balkans—an Aegean origin was for a long time accepted for many of the later prehistoric cultures of central and western Europe. A tradition of acceptance for such parallels has grown up, a diffusionist outlook (Renfrew 1967b; 1969c), which often exaggerates the intensity and the importance of long-distance trade in prehistoric times. A more critical approach is needed.

On the other hand, the durable objects constituting the archaeological record—pottery, metal, obsidian, emery—offer only a small part of the possible range of commodities traded. Much of the evidence for early trade has perished. The distribution of pottery finds in the late bronze age suggests an Aegean export of perfumed oil, for instance, while Egyptian paintings remind us that textiles too may have been traded commercially. Slaves, wine, wood, hides, opium, lichens even (Persson 1942, 177) make up a considerable repertoire of traded materials which are only rarely recorded archaeologically. The range and volume of trade could thus have been far greater than the record now documents.

The only acceptable interpretive procedure is to start first with the commodities and objects whose exchange can definitely be established, and to use these to build a preliminary picture of the extent of trade. Less reliable cultural ‘parallels’ can then be used to fill out this picture. There is unfortunately no good case for extrapolating backwards from the colonies of the classical Greeks or the conquests of the Romans to re-create a thriving prehistoric commerce which may never have existed.

In this chapter the evidence for the external trade of the Aegean cultures of the neolithic, early bronze age and later periods is discussed. *External trade* designates exchange of goods beyond the limits of the culture areas of the various prehistoric cultures: a clear distinction may be drawn between external trade within the Aegean and trade with other areas of the Mediterranean or beyond. After a review of the evidence an attempt is made to use the various distributions of finds to suggest the different trading mechanisms involved. Finally the significance of these trading contacts for communication and the flow of innovations is briefly considered.

Neolithic External Trade in the Aegean

The earliest commodity demonstrably traded in the Aegean was, as in so many parts of the world, obsidian. Trace-element analysis has shown that nearly all the obsidian used in the Aegean in neolithic times came from the Cycladic island of Melos (Renfrew, Cann and Dixon 1965). Obsidian from the source at Antiparos has been found only at the nearby site of Saliagos. The third Aegean source at Giali in the east Aegean yields an obsidian which does not fracture conchoidally, and is hence not ideally suited to the manufacture of blade and flake tools. Doubtless it was used in the immediate vicinity of Giali; the only indication of more widespread use in neolithic times comes from just a few finds at Saliagos (Evans and Renfrew 1968, 105).

No obsidian from the Balkans or the western Mediterranean has been recorded from the Aegean neolithic, or indeed from any period of Aegean prehistory, nor has Anatolian obsidian been identified from neolithic contexts.

Melian obsidian, on the other hand, is found at every early neolithic site in southern Greece (fig. 20.1). It appears at the Franchthi Cave before 6500 BC, at Knossos at 6000 BC (in the earliest levels), and in pre-pottery neolithic Argissa in Thessaly. Just a few chips were found at early neolithic Nea Nikomedeia in Macedonia.

The percentage of obsidian in the total chipped stone assemblage at some of these sites has been established: it was reportedly more abundant than flint at Knossos and Argissa, although much scarcer at Franchthi. Yet none is found at the neolithic sites on Corfou discussed by Sordinas (1970) and it is extremely rare in Macedonia.

The distribution is one of the few clues available for a reconstruction of the trading mechanism. The relative abundance at neolithic sites in the western Aegean is noteworthy, together with this extreme scarcity in Macedonia and the northern and eastern Aegean.

The sea is a vitally important factor here, and it is clear that from around 7000 BC mariners in the southern Aegean were capable of reaching Melos, probably by a process of island-hopping. Crossings by open sea may have been difficult, and expanses of open water wider than about 150 km were probably avoided altogether.

There is no evidence that this traffic in obsidian was on a reciprocal basis, for Melos appears to have been uninhabited in early neolithic times. Despite a survey, no early neolithic sites have been found there, although the chipping floors at Adhamas and Dhemenegaki on Melos document intense quarrying activity from the neolithic well into the bronze age. The large flake tools of obsidian found there are not seen elsewhere in the Aegean, and were clearly utilised in the quarrying operation (pl. 26, 3). The obsidian seems to have been roughed-out into approximately conical cores (pl. 26, 5) and transported in this form to be worked into artefacts where these were to be used. The evidence of Saliagos was conclusive on this point: as well as cores and splendid artefacts, some worked in flat-flaking technique (pl. 26, 4), abundant chipping waste was found.

This absence of early neolithic settlement on Melos suggests that persons requiring obsidian simply went and quarried it. And the distribution of finds indicates that

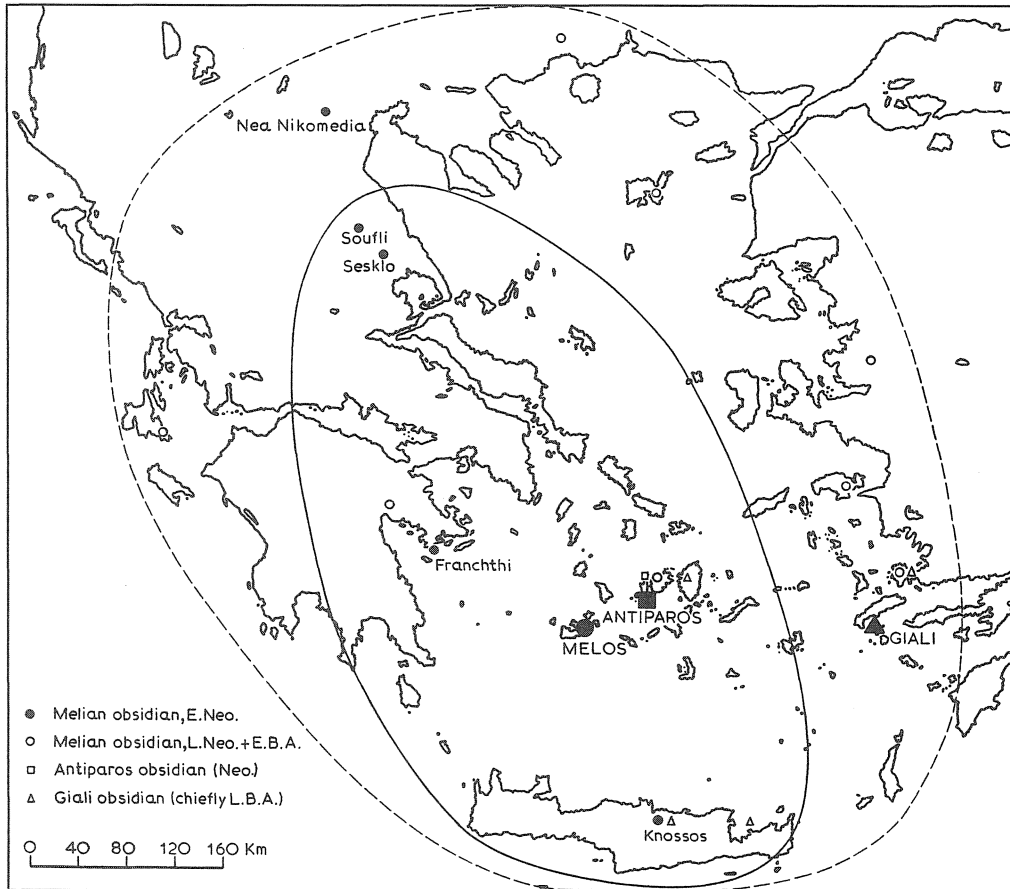


FIG. 20.1 The early obsidian trade. Obsidian from Melos was already in the early neolithic period reaching destinations within the inner ellipse in considerable quantity. The outer ellipse indicates the extent of the obsidian trade in the early bronze age: no finds of Aegean obsidian have been made outside it. The findspots indicated are those for which the source of the obsidian used has been determined by spectrographic analysis.

the inhabitants of the Cyclades, of Crete and of eastern mainland Greece (south of Thessaly) shared the opportunity and the knowledge to do this.

Emery from Naxos reached the other Cyclades, but possibly no further; few other commodities were traded in the neolithic and indications of contact between the various regions of the Aegean are exceedingly few.

At this period there appears to have been no significant maritime contact with areas outside the Aegean. Aegean objects have not been recognised further afield in the Mediterranean in secure contexts, nor have Mediterranean objects been found in the Aegean. Fragments of Egyptian bowls at Knossos from the end of the neolithic period are the sole exception (fig. 20.2).

The most interesting suggestion of contact on land comes from the distribution along the Danube of bracelets and ornaments of the marine shell *Spondylus gaederopus*. Recent analysis by Shackleton of examples found in the Balkans have shown them to be of Mediterranean and hence doubtless predominantly of Aegean origin (Shackleton and Renfrew 1970). The long-range *Spondylus* trade, on which several authors have written (Clark 1952, 242), can now be regarded as established.

The discovery of numerous *Spondylus* bracelet fragments in levels of phase III at Sitagroi in east Macedonia is doubly significant, since the phase III finds so closely resemble those of the Gumelnitsa culture of the Balkans. The territory of the Gumelnitsa culture complex apparently extended from the Aegean almost to the middle Danube: *Spondylus* ornaments are found throughout this area. The considerable distances over which these ornaments travelled, and their relative abundance even in regions distant from the Aegean, suggests that a trading mechanism was in operation very different from that which distributed obsidian. In a later section it is proposed that this is an instance of the operation of the prestige chain model, where objects of especial value are transferred by gift exchange.

With this striking exception, objects of Aegean origin are not seen further afield during the neolithic. The limited range of contacts implies a lack of effective communication between culture areas; in no sense did the Aegean region constitute a cultural unity at this time.

Trade beyond the Aegean in the Third Millennium

The improved ships available in the third millennium greatly extended the scope of trading activities. Their impact is most clearly seen during the Early Bronze 2 period, when there are signs of intensive communication between areas within the Aegean.

A sharp distinction may be drawn between the close trading contacts which developed between the various cultures of the Aegean, and the much more tenuous contacts with areas elsewhere in the Mediterranean. This is a crucial question for the development of Aegean civilisation and is worth considering in some detail.

No objects of west Mediterranean origin have been found in Aegean contexts datable to the third millennium BC. Despite claims by numerous scholars to the contrary, there are no conclusive finds of Aegean objects in the west Mediterranean before the Middle Helladic pottery from Sicily and the Lipari islands (Taylour 1958, 13 and 55). Early Cycladic jugs supposedly found at Marseilles and at Addaya on Minorca (Benoit 1956, 12 and 17; Almagro 1940, 117) were probably transported thither in recent times. With the advent of radiocarbon dating the evidence for direct Aegean contact with Malta before the Tarxien Cemetery period (Renfrew 1970b) appears unconvincing, and there is no conclusive evidence of Aegean contact with Iberia before the time of the El Argar culture (Renfrew 1967b). Certainly there are similarities between Sardinian marble figurines and those of the Keros-Syros culture in the Cyclades, but no Cycladic

imports have been found in Sardinia. The bossed bone plaques of Malta and Sicily do indeed resemble one from the Tiryns culture levels at Lerna, and the first contacts may have been developing at this time, contacts which became stronger in the middle bronze age. But for actual trade or exchange between the Aegean and the west Mediterranean in the third millennium BC we have no evidence at present.

Turning now to the east Mediterranean, we find again that positive indications of contact are much fewer than has sometimes been supposed. Reported finds of Aegean obsidian in the Near East or Egypt have not been substantiated (Renfrew, Cann and Dixon 1965, 228), nor does it seem likely that Cycladic marble (Renfrew and Peacey 1968, 47) or emery (Lucas 1962, 42) reached Egypt. No single object of early bronze age date, and of Aegean manufacture, has been recognised in Sumer, on the Levant coast, or in Egypt. Several workers in Cyprus have indeed identified daggers from Lapithos and Vounous as Early Minoan (Branigan 1968a, 61), but it is clear that the total of Aegean exports at this period was small.

No single object of Near Eastern or Egyptian manufacture has yet been recognised in an early bronze age context in mainland Greece. Perhaps the only find of this period from the Cyclades or the islands of the eastern Aegean which must unequivocally be an import is the ivory seal from Poliochni in Lemnos (pl. 23, 3; Brea 1957, 208, fig. 25). The ivory at least is foreign, although the loop seal is an unusual form and it is not impossible that the workmanship is local. The greenstone cylinder seal from Kapros in Amorgos (pl. 23, 2; Renfrew 1967a, 7 and pl. 4, 19) has also been compared with possible Near Eastern prototypes (Frankfort 1939, 70 and 301; Buchanan 1960, no. 741), but while Near Eastern influence is certainly a possibility, clay cylinder seals at least a millennium older have been found at Sitagroi in north Greece. It would at least be possible to argue a local inspiration.

The virtual absence of any undoubted Near Eastern import from the early bronze age settlements of Troy is also notable. Ivory has in fact been found stratified in levels of the first and second cities (Blegen et al. 1950, II, 303; Schliemann 1880, 261 and 423–25), but the workmanship may well be local. Lapis lazuli has been claimed among the Troy finds (Childe 1956, 41; Schmidt 1902, 287, no. 7762 [unstratified]), but Schliemann himself did not make this claim, nor was the shaft-hole axe from Treasure L originally so designated (Schmidt 1902, 243, no. 6058). So that, although lapis lazuli was in use in later times both in Mesopotamia and in Egypt (Herrmann 1968, 29; J. C. Payne 1968, 58), its presence in Troy II seems altogether doubtful.

The presence of jade at Troy seems equally unlikely. Schliemann's greenstone axes were examined by Professor N. Story-Maskelyne who identified them as nephrite on the basis of a specific gravity determination (Schliemann 1880, 240). It is, however, now well established that jadeite and nephrite cannot be identified solely on the basis of their specific gravity, and X-ray diffraction analyses are desirable (Campbell-Smith 1963, 154). Consequently, the identification of the Troy axes may have been erroneous—certainly the criteria were inadequate, and these, like the 'jadeite' axes of Sesklo (Tsountas 1908, 314), were probably of greenstone. In any case, several sources of the material are now

known in the Alps (Campbell-Smith 1965, 26) and another has recently been identified in the Aegean,¹ so that no contact with the east would necessarily be established.

It is only in Crete that several classes of undoubted imports, originating outside the Aegean, are found. They document a significant and sustained contact, of a kind not seen elsewhere in the Aegean, which must certainly be taken into account.

The early Egyptian stone vases in Crete have been studied by Pendlebury (1930), Reisner (1931) and more recently by Warren (1965; 1969b). Although the Cretan contexts of the earlier Egyptian forms are uncertain, Warren argues persuasively that most

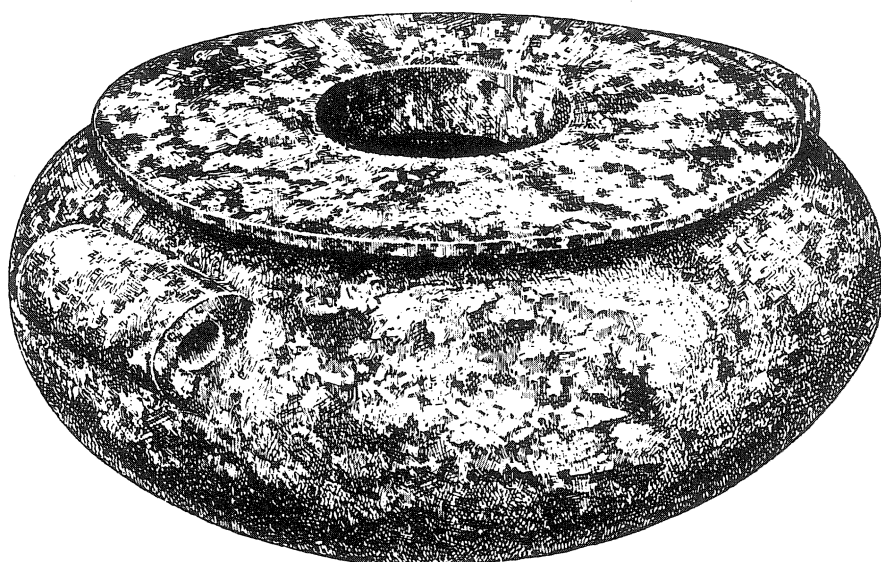


FIG. 20.2 Early import from Egypt: a predynastic bowl of porphyry found at Knossos (after Evans). Diam 28 cm.

were imported to Crete during the time of their *floruit* in Egypt. In addition two bowls, possibly of Egyptian manufacture (Warren 1965, nos. 5 and 13), were found in a late neolithic context at Knossos (Evans 1921–35, II, 16). Thirty-two Egyptian stone vases of Predynastic to First Intermediate date are known from Crete.

Since ivory is not naturally available in Crete the raw material for all objects of the substance found in Early Minoan contexts must have been imported. But caution should be expressed here, for some of those identified in literature as of ivory may in fact be of bone, of boar's tusk or of antler (Penniman 1952). The Egyptians used ivory both from the African elephant and the hippopotamus (*ibid.*, 15; Lucas 1962, 32), while Asiatic ivory (from the Indian elephant) was used in India and very possibly in Syria.

1 On the island of Syros (personal communication, Dr J. E. Dixon).

So theoretically a characterisation study might allow a decision as to whether Cretan specimens came from Egypt or from the Levant. This would clearly be of interest also for the Troy specimens, the Poliochni seal and the fragment from Amorgos (Renfrew 1967a, 7 and pl. 4, 25) which has also been claimed as of this material.

Many of the Early Minoan seals are of ivory (fig. 6.7). Several were found at Mochlos (Seager 1912, fig. 11, II, 41–42; fig. 24) and many more in the Mesara (Xanthoudides 1924, pls. VIII, XIII–XIV). Many of them are cylindrical with designs incised at each end, but particularly interesting are those which by their form, as well as through the material, suggest an Egyptian or Near Eastern influence. Most notable of these is a seal in the shape of a lion crouching over a man (fig. 21.3; *ibid.*, pl. VIII, 821) together with a seal in the shape of a dog-headed ape (Xanthoudides 1924, 114 and pl. XIII, 104). A seal in the

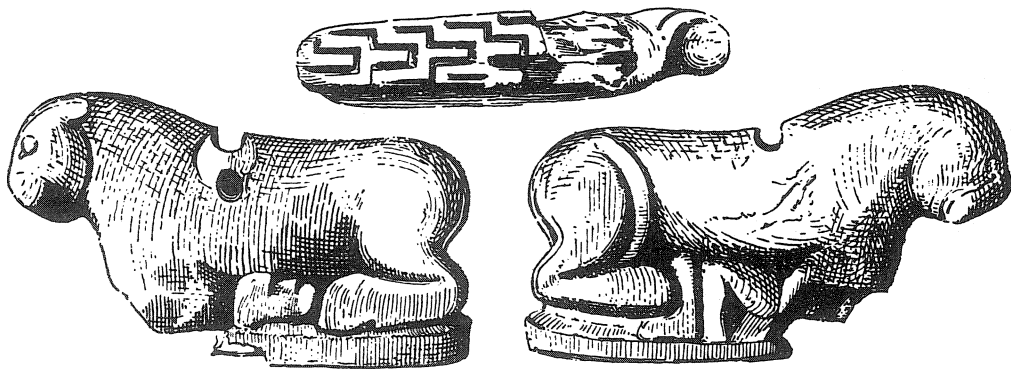


FIG. 20.3 East Mediterranean origin of material and of motif: Early Minoan ivory seal from the tholos tomb at Kalathiana, showing a lion crouching over the body of a man (*after Evans*). Length c. 4 cm.

form of a seated monkey was found at Trapeza (Pendlebury and Money-Coutts 1936, 97 and pl. 14, 7) and an ape amulet at Platanos (Xanthoudides 1924, pl. xv, 1026). Such ivory seals and amulets may well be of Cretan manufacture, but they were certainly inspired by Egyptian or Levantine designs. It should be noted, however, that only one of the ivory seals from Mochlos (Seager 1912, fig. 24, no. VI, 26) and three from Lebena (Warren 1970, 32) were found in reliable Early Minoan II contexts. The Sphoungaras seals, both of ivory, are either of Early Minoan II or Early Minoan III date (Kenna 1960, 15; Warren 1970, 37). The remaining ivory seals of Crete, coming as they do from collective tombs, may be Early Minoan III or later, and very possibly belong to the First Palace period of Minoan Crete. Most of the Egyptian scarabs found in Early Minoan funerary deposits (Pendlebury and Money-Coutts 1936, pl. 14, 16; Xanthoudides 1924, pl. xiv, 1075) may equally be dated to the Middle Minoan period.

One of the most remarkable discoveries at Trapeza, which has not received the comment it merits, is a figurine head in ivory (Pendlebury and Money-Coutts 1936, 121 and pl. 19, 7). As the excavator remarked, it does not seem to be of Cretan workmanship, with its very round and carefully modelled head, and its inlaid eyes. It may well be of Syrian origin. Other ivory figurines have been found at Aghia Triadha and Platanos (Xanthoudides 1924, pl. xv, 229). A beautifully carved little figure from Porti, which may be of ivory, although published as of burnt steatite (*ibid.*, 67 and pl. xxxix, 171), again suggests the influence of a foreign artistic convention. But it may not be as early as the Early Minoan period.

These finds, therefore, while in a few cases documenting the early importation of ivory, may serve rather to underline its popularity in the early part of the succeeding First Palace period.

Jade has not been reliably recognised in Crete. Lapis lazuli, although used from Middle Minoan times, may not yet have been known in the Early Minoan period: the bead from Koumasa (*ibid.*, 31) could well be of Middle Minoan date. A further imported material, also reaching Crete in small quantities during the Middle Minoan I period and possibly earlier is obsidian from Cappadocia (Renfrew, Cann and Dixon 1965, 239).

A further indication of possible contact with Egypt is provided by faience beads and by the faience bowl found in Tomb VI at Mochlos (Seager 1912, 54–55). While much Minoan faience is likely to have been of local manufacture (Xanthoudides 1924, 31) the technique of production of the material may well have been learnt from Egypt or from the Levant. On the other hand, faience beads are found already in the Royal Tombs at Alaca Hüyük (Stone and Thomas 1956, 45) and indeed at Troy (Schmidt 1902, 224, no. 6124). The technique could therefore have been learnt from Anatolia, and the possibility of local invention should not be overlooked (see chapter 17).

Other possible indications of Near Eastern and Egyptian contact with Crete are more hypothetical, although mention should be made of the Egyptian flint knife found at Knossos apparently in a Middle Minoan context (Cadogan 1966). Egyptian influence on Cretan figurines has been argued by some scholars, but rejected by Banti (Pendlebury 1939, 74). Many of the remaining, supposedly diffused, traits are regarded as such simply because they are seen earlier in Egypt than in Crete. Monumental building in dressed stone, as seen in the Minoan palaces, finds a respectable ancestry in the funerary constructions of the Early Minoan period.

Metallurgy, and the metal forms employed, are nearly always cited as instances by those arguing the diffusionist case. But a closer examination of the evidence does not support this view. In chapter 16, it is shown that metallurgy in the Aegean had local antecedents in the neolithic period, long before Egyptian or Near Eastern influence is documented in Crete. Branigan (1966a) has indeed suggested that during the First Palace period, Minoan smiths imitated certain dagger forms of the Levant, but before this time there is no good indication of influence from the east or south. He refers to the 'variety and individuality of metal working in early bronze age Crete' and suggests

that knowledge of metallurgy came to Crete from the Cyclades (Branigan 1968a, 54–55; 1968b). The evidence of the bronze and copper tools undoubtedly supports this position: the axe-adze found in the Early Bronze 2 period is a specifically Aegean form and the shaft-hole axe seen at Thebes, Petralona and Poliochni makes its earliest appearance in the Aegean (Renfrew 1967a, 8–9).

Beyond the finds of ivory and the Egyptian stone bowls in Crete there is little evidence for outside contact during the third millennium.

External Trade within the Aegean in the Early Third Millennium

The contacts of the Aegean with the east Mediterranean thus seem to have been few and rather tentative during the third millennium, being restricted primarily to Crete. Within the Aegean, on the other hand, a more vigorous trade between the different culture areas is indicated. The fairly widespread availability of many materials unfortunately makes a characterisation study difficult, and much evidence for this contact thus comes from similarities in form rather than from identifiable raw materials.

Melian obsidian was still widely transported. The pattern follows that of the neolithic period, although the increased range of ships led to better supplies in some areas. Obsidian is now found on the Ionian islands, and on the islands of the eastern Aegean. It remains very rare in the north Aegean, however, and this region apparently did not participate in the increased trading activity of the time (fig. 20.1).

Several settlements now existed on Melos, and these may possibly have controlled the Melian quarries. There is no evidence for directional trade, or indeed for commercial trade at all, and imported objects in Melos remain very few—principally an Early Minoan II stone bowl found at Phylakopi (Atkinson et al. 1904, 196). It is perfectly possible that those who required obsidian continued to cross over to Melos and mine it for themselves.

The material was still transported in the form of conical cores, examples of which were found at Aghios Kosmas and elsewhere in Attica (pl. 26, 5; Geroulanos 1956). These were now worked to produce long and narrow blades, which allowed much more economical use of the material. The core grew progressively smaller as it was worked, and its conical shape was retained by trimming, and detaching the trimmed portion of the core in the form of a further blade—the dog-tooth core-rejuvenation blade (pl. 26, 6). Small worked-out cores are sometimes found in the Cycladic graves, used as pestles for grinding pigment in a marble bowl.

There is no evidence yet that emery was widely transported, and the difficulty of characterising the various Aegean marbles (Renfrew and Peacey 1968) makes the documentation of a marble trade very difficult.

Other indications of trade and of communication must come from comparison of form, since other raw materials cannot be characterised. Very close resemblances in metal or pottery shapes, for example, can unequivocally indicate community of inspi-

ration, whether or not the actual objects in question were transported. Many of these resemblances or 'parallels' were considered in chapter 13 for the chronological information which they yield. Here it is the nature and intensity of contact which interests us. There is no circularity in using the same evidence both for dating and for the study of communication. If the close similarity in form—for instance of 'sauceboats' found in the Cyclades and the Korakou culture—is accepted as documenting a common origin, both contact and contemporaneity are possible deductions from the evidence.

In the Early Bronze 1 period such contacts were not much more numerous than in the final neolithic. The marble rhytons of the Grotta-Pelos culture indicate occasional contact with the east Aegean and the Cycladic-looking bottles in the Pyrgos Cave document contact with Crete. Cist graves and their contents in Attica and Euboea (fig. 11.5) show that the contacts between these regions and the western Cyclades, initiated during the final neolithic Attic-Kephala culture, were maintained.

The contacts with Anatolia require further consideration since some writers, as indicated in chapter 4, have felt them so numerous as to indicate not simply maritime contact but a population movement. The Macedonian early bronze age, with its dark burnished ware, has close analogies with the culture of Troy I. The material at Kritsana or Sitagroi V shows few distinctive forms not seen at Troy. Close contact or indeed population movement are thus possible explanations for these north Mediterranean areas, but the same arguments are not applicable to Thessaly or south Greece.

The rolled-rim bowls of the Grotta-Pelos culture have, as reviewed in chapter 10, been compared with those of Kum Tepe Ib (cf. fig. 10.6), and the resemblance is undeniable. Yet most features of the Grotta-Pelos culture are distinctively individual: some, like the schematic figurine shape, have antecedents in the local neolithic. The reasons for the similarity in bowl forms, seen already in the final neolithic, is not yet clear: it does not, in any case, document contact during the Early Bronze 1 period.

A number of individual parallels between Early Minoan I artefacts and those in various Anatolian contexts can be drawn. The case has been argued in detail, although not yet in print by Warren (cf. 1965, 37). Many of the suggested links lie with Troy I, but the Troy I assemblage, taken as a whole, is dissimilar from that of Early Minoan I, notably in the marked absence of painted pottery. Other parallels, for instance in the case of the Early Minoan footed pyxides, are more effectively made with the Yortan culture, while a similarity frequently indicated is that between the pattern-burnished decoration on the Pyrgos pottery and that of Beşikatepe (see chapter 5 above). But the Anatolian context is here a neolithic one, long antecedent to Troy I, and the chronological dispersion as well as the geographical range of the parallels, becomes uncomfortably wide. To the present writer these similarities suggest no more than occasional voyages between Crete and the west Anatolian coast. No clear imports have been found in either region.

There is thus no good indication either of directional trade or of prestige chains in the Aegean Sea during the Early Bronze 1 period. Occasional, apparently random indications of seaborne contact are found, which may indicate the beginnings of freelance

commerce, but clearly land contact along the north Aegean coast was more effective. Neither the range nor the scale was much greater than in the neolithic period.

Aegean Contacts in the Later Third Millennium

A remarkable episode in the Early Bronze 2 period transformed what were hitherto essentially independent cultures in different regions of the Aegean into a complex of related units, whose individuality although at first distinct became gradually less marked as the bronze age continued. Indications of contact became suddenly very much more numerous: an international spirit was abroad, and forms and conventions in one region were very much more readily adapted in the others.

That this came about through contact, usually peaceful contact, cannot be doubted. There is absolutely no evidence for any political domination of one region by another at this time, and very little indeed for any permanent movement of population.

The archaeological evidence for trade now becomes very much stronger, although finds of imported raw materials are few. Emery may have been brought from the Cyclades, and stone for grindstones and querns. Obsidian was as widely traded as in the Early Bronze 1 period. Metal, above all, must have been the chief new commodity traded, although finds of ingots are not made until the late bronze age and the products of the mines of different regions of the Aegean have not been distinguished by analysis, so that it is the analogies in the form of finished objects which document the trade most clearly.

Although the direct evidence for traded materials is scanty, the great increase in convincing parallels between the areas leaves no doubt that contact, presumably through trade, had increased dramatically. Many of the widespread types were reviewed, for their chronological importance, in chapter 13. While some similarities may arise purely from analogous functional requirements—the development of stone fortifications and semi-circular bastions, or the widespread distribution of built graves, or the rise of metallurgy itself, are cases in point—others are so specific as to indicate an undoubted common origin.

Among the metal shapes, the midrib dagger of Type IV is widely seen in mainland Greece, Crete and the islands (fig. 16.7). It is indeed the principal Cycladic dagger form. The widespread distribution of other Cycladic forms, in stone as well as in metal suggests that much of the trading activity was carried out by Cycladic mariners in their long-ships (pl. 28, 3 and 4).

Tweezers are another favourite metal shape, found very abundantly in Crete and the Cyclades (fig. 11.3). Many other copper and bronze tools and weapons have a wide distribution—the slotted Cycladic spearhead (fig. 16.7) is a further instance. Flat axes, awls and pins are found everywhere.

It is important to set in perspective both the wide distribution of so many metal types, suggesting frequent contact and communication, and the pronounced regional

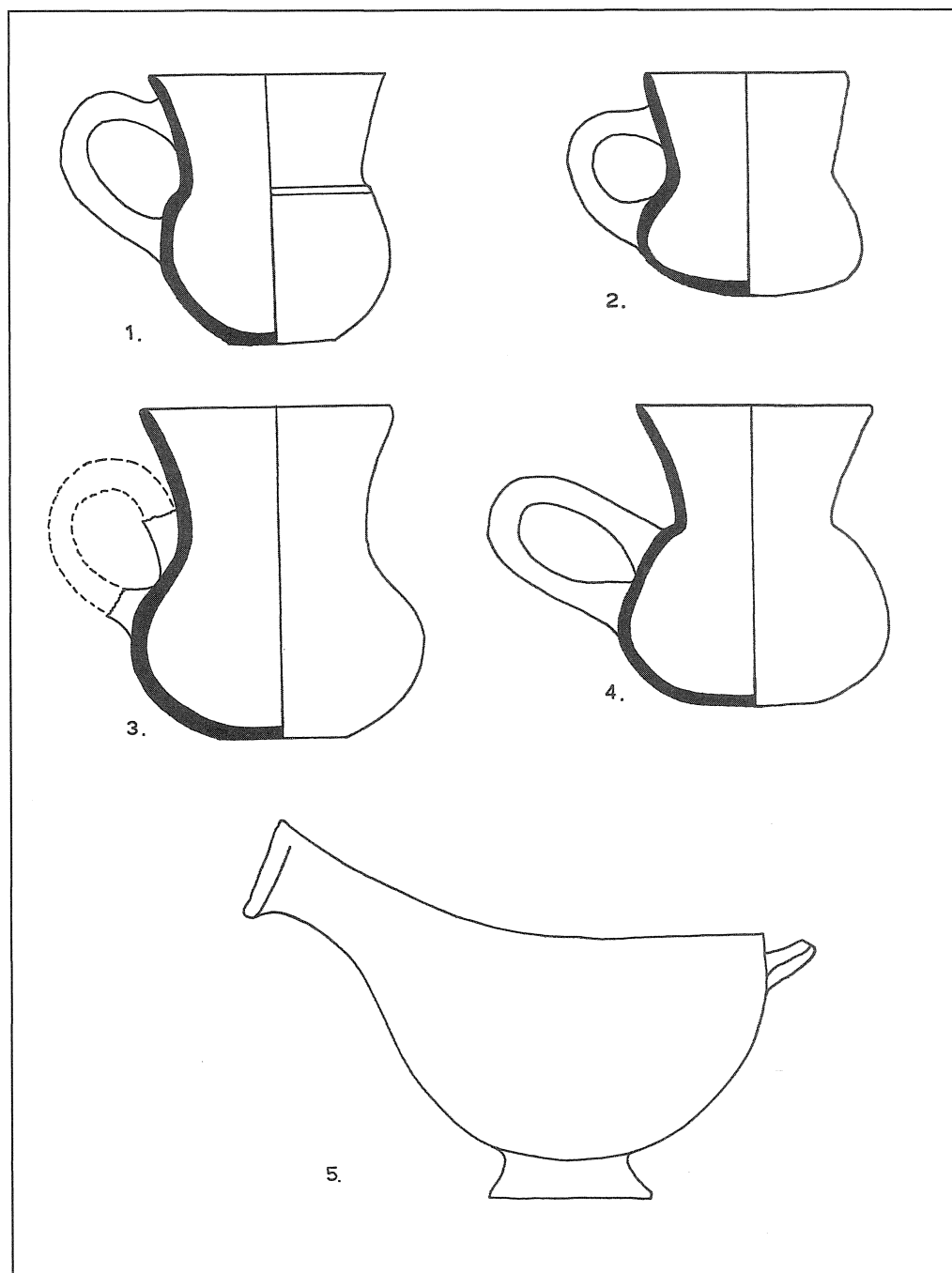


FIG. 20.4 Forms documenting the international spirit of the Early Bronze 2 period in the Aegean: the one-handled cup and the 'sauceboat': 1, from Chalandriani in Syros; 2, Lebena in Crete; 3, Panormos region, Naxos; 4, Poliochni in Lemnos; 5, Panormos region, Naxos. Scale 2 : 5.

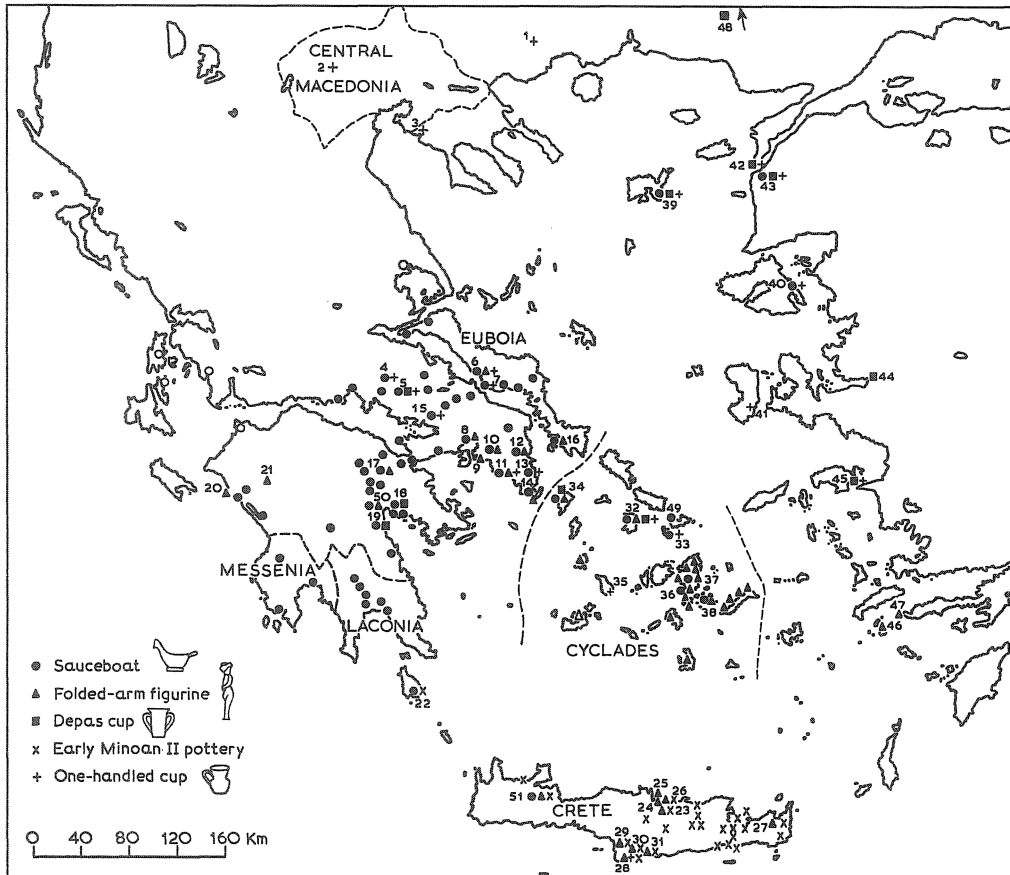


FIG. 20.5 The international spirit of the Aegean Early Bronze 2 period. Findspots of certain types of wide distribution. (There are many additional finds, not indicated on the map, of Early Minoan II pottery in Crete, of folded-arm figurines in the Cyclades, and of *depas* cups elsewhere in Anatolia. The distribution of 'sauceboats' in mainland Greece, based on French 1968, is a simplified one.)

Findspots: 1, Sitagroi; 2, Vardarophtsa; 3, Kritsana; 4, Aghia Marina; 5, Orchomenos; 6, Manika; 7, Lefkandi; 8, Eleusis; 9, Piraeus; 10, Athens; 11, Aghios Kosmas; 12, Brauron; 13, Raphina; 14, Sounion; 15, Eutresis; 16, Styra; 17, Zygouries; 18, Tiryns; 19, Lerna; 20, Aghios Andreas; 21, Neraidha; 22, Kastri; 23, Knossos; 24, Teke; 25, Herakleion; 26, Pyrgos; 27, Siteia; 28, Lebena; 29, Aghios Onouphrios; 30, Platanos; 31, Koumasa; 32, Chalandriani; 33, Kynthos; 34, Aghia Irini; 35, Akrotiraki; 36, Spedos; 37, south-east Naxos, uncertain location; 38, Dhaskalio; 39, Poliochni; 40, Thermi; 41, Emborio; 42, Protesilaos; 43, Troy; 44, Bayraklı; 45, Heraion; 46, Karpathos; 47, Kap Krio; 48, Michailitch; 49, Dhiakophtis; 50, Argos; 51, Platyvola.

variation in the metallurgy, especially in silver and gold, discussed in chapter 16. The localised distribution of the Anatolian tanged dagger and the daggers of Type IIIb, contrasting so strikingly with those of Type IV, has been mentioned in an earlier chapter. Tweezers are indeed of wide distribution, yet shaft-hole tools are scarcely found in Crete, with the exception of the double axe which is itself predominantly a Cretan form.

Cretan goldwork is generally in the form of sheet metal—diadems, sprays of flowers and other fine gold work is seen at Mochlos. In the eastern Aegean, on the other hand, there is a love for dangling pendants, while in Levkas, conical and biconical beads of sheet gold were preferred. In the Cyclades gold may not have been available, for the finery is of silver, especially bracelets and armlets of the forms described in chapter 16. These are regional preferences indicating, as do a few metal analyses (for instance the frequent alloying of copper with arsenic in the Cyclades), strong individuality in the local metallurgical traditions. The pattern in the Aegean at this time is not one of uniformity or conformity, but of marked local individuality stimulated rather than suppressed by the exchange of ideas between regions.

There are now far more analogies among the pottery forms: the one-handled cup has a wide distribution (figs. 20.4 and 20.5) and 'sauceboats', a common form in southern Greece and the Cyclades, are occasionally found as imports in the eastern Aegean. The Anatolian *depas* cup was imitated in the Cyclades and southern Greece (fig. 20.5), although most of the finds may result from the Anatolian influence in the Aegean during the Early Bronze 3 period. Jugs are found throughout the southern Aegean. This intensive exchange of objects and especially of ideas did not extend to the northern Aegean however. Thessaly and Macedonia stand apart from this international spirit: the ubiquitous metal forms of the southern Aegean are not found, 'sauceboats' and *depas* cups are lacking. Even jugs are uncommon. The suggestion was made in chapter 15 that the widespread distribution of jugs and cups may be associated with the production of oil and wine. If this were so, the more frequent use of such forms in the southern Aegean, the region of true Mediterranean climate, may be more understandable (fig. 18.12).

The contacts between the regions of the southern Aegean are further documented by the importation and the copying of stone objects. Mention has already been made of the Cycladic marble pyxides found in Crete (pl. 6, 5 and 6). In both the Cyclades and in Crete finds have been made of vessels carved in chlorite schist with an elaborate decoration of spirals in relief (pl. 15, 1). Above all, marble folded-arm figurines of Cycladic manufacture were imported in Crete, and imitated there by craftsmen who created a new version of this type, the Koumasa variety (cf. fig. 19.7; pl. 30, 3, 4 and 6). Cycladic marble figurines are found also in mainland Greece, as are shallow marble bowls.

The economic significance of this trade should not, however, be exaggerated. It was, one suspects, largely freelance activity which the Cycladic mariners found a profitable sideline to supplement the cultivation of their meagre lands. Only the Early Minoan II 'colony' on Kythera at this time suggests any form of more systematic trade. Elsewhere

the diet of the traders must have been provided chiefly at home, since the trade was neither so well organised nor so sustained as to furnish a reliable and constant source of food.

Two principal factors may be singled out as contributing to the increase in trading activities. The first was the great improvement in sea travel brought about by the invention of the longboat. We have seen that from the earliest neolithic times sailors were able to travel from Crete to Melos, or from mainland Greece to Melos, in order to fetch obsidian. But the small boats available must have made this a hazardous business. The range of sea travel was greatly increased in the early bronze age—as we have observed, it is now that regular contact with Egypt and the Levant became possible. And now for the first time, there were close contacts between Anatolia and both mainland Greece and the Cyclades. Distances had in practical terms become much shorter.

For the first time, too, there was a commodity really worth trading. Obsidian had long been a valued commodity, but hardly an indispensable one. Metal, on the other hand, must very rapidly have been seen as a necessity. Without metal weapons the third millennium islander would have been as helpless as the Incas before Pizarro. Metal tools, and especially adornments and vessels of gold and silver, must have been very highly prized, and for a while trading activity must have centred upon this attractive new commodity.

By the Early Bronze 3 period this remarkable burst of trading activity had died down. Contacts were probably just as close—duck vases like those of the Cyclades, for instance, are seen both in mainland Greece and Anatolia (fig. 12.4)—but the intensity in the effect of these contacts seems diminished. None the less, the increased efficiency in communication lead the Aegean to function, for the first time, in some ways almost as a single cultural unit.

Evidence for Trade in the Later Bronze Age

Trade in the third millennium had advanced in two directions. In the first place an enduring, if intermittent, contact had been established with the eastern Mediterranean. And the various regions of the Aegean were now in frequent if irregular contact one with another. The later bronze age saw both kinds of communication greatly strengthened.

To consider this in detail would lie outside the scope of the present survey: our interest here lies principally in the formative period for Aegean civilisation, the third millennium BC. The abundant evidence from the later bronze age does, however, allow the reconstruction of a picture which, by the modesty of the trading activity it implies, is instructive for this earlier period also. The purpose here is to consider this evidence in the barest outline, in order to permit the discussion of trading mechanisms which follows in the succeeding two sections.

Three phases of activity may be seen in the later bronze age, before the sharp decline in Aegean trade at the onset of the Late Helladic IIIC period around 1200 BC. In

the middle bronze age Crete was the dominant region in the Aegean culturally and economically, if not politically. The same was true in the Late Minoan I and II periods, although Mycenaean trading activity outside the Aegean is more evident in the archaeological record. In the Late Helladic IIIA and B phases, after the 'fall' of Knossos around 1400 BC, Mycenaean trading activity everywhere took first place.

During the middle bronze age Minoan influence was more widely felt in the Aegean than during the third millennium. The Minoan finds on Kythera are supplemented by those at Phylakopi in Melos (pl. 13, 4), and Akrotiri on Thera, although neither of these need have been colonies. Middle Minoan Kamares ware is found further north at Aghia Irini on Kea, and at several mainland sites, including Lerna and Aegina. Helladic Minyan ware is found widely in the Aegean islands, and Middle Cycladic pottery occurs both in Crete (pl. 13, 2) and on the Greek mainland: a splendid Cycladic jug was found at Lerna.

Contacts beyond the Aegean remained rather few. The first awakening of mainland interest in the west Mediterranean is suggested by finds of Middle Helladic pottery at Monte Sallia in Sicily and Filicudi in the Lipari islands (Taylour 1958, 13). In the east Mediterranean contacts are exclusively Minoan. Numerous Minoan objects have been found in Cyprus (Catling and Karageorghis 1960), and from the Middle Minoan period pottery from Crete was reaching the Levant (Ras Shamra) and Egypt (Haraga, Abydos, Lahun) (Stubbings 1951, 53; Pendlebury 1939, 144). The finds are not numerous, however, and scarcely suggest that Ras Shamra or other Levantine sites had a Minoan colony at this time.

Imports from the east Mediterranean came chiefly to Crete. At first they were mainly small and exotic objects: scarabs, beads and amulets. Tholos B at Platanos contained a Levantine cylinder seal as well as Egyptian scarabs. Some Egyptian stone vases were also imported. But one or two objects are of a special kind. A limestone head from Middle Minoan I levels at Knossos looks distinctly Sumerian (Pendlebury 1939, 122). Undoubtedly of Egyptian manufacture is a diorite statue, now headless, from Middle Minoan IIb levels at Knossos: it is inscribed with the name of its original owner, and is datable to the Twelfth or Thirteenth Dynasty (*ibid.*, 143). Finally, an alabaster lid was found at Knossos bearing the name of the Hyksos pharaoh Chian (*ibid.*, 172). These three finds are something beyond the usual repertoire of scarabs and beads.

In the Late Minoan I and Late Minoan II periods, Minoan influence in the Aegean was at its height. Whereas previously finds were usually limited to occasional occurrences of Kamares ware, Minoan indications were now far more pronounced. The distribution of Minoan stone vases in the Aegean makes this very clear. No less than 43 have been found at Mycenae (Warren 1967a, 50), and others at sites in the Argolid as well as in Attica. At Aghia Irini on Kea 26 were found, and a find in Naxos now supplements those of Thera, Phylakopi and Kythera.

The axis of interest was with the Argolid and the emerging Mycenaean world: the stone vase finds reflect no activity in the eastern Aegean. Many less direct traces of Cretan influence upon the mainland are found from this, the most prosperous period

of Minoan civilisation, while the Mycenaean civilisation was in its very early stages. Few would today follow Evans's view that the Mycenaean civilisation was simply an offshoot of the Minoan, yet the art of the mainland does show many Minoan motifs and techniques. Amphorae are decorated in what is recognisably a version of the Knossian Palace Style, and Wace and Blegen (1939) have written of a widespread taste in *Crétoiserie*.

Abundant finds of Minoan pottery have been made at Trianda on Rhodes, and Furumark (1950) regards this as a Minoan colony during the Late Minoan I (and II) periods. He suggested too that Phylakopi in Melos was under Cretan rule after the destruction of the Second City, but Scholes sees no evidence of a change in status at this time (1956, 39), for Phylakopi shows strong Minoan influence already during the middle bronze age. In any case the contacts were strong and sustained.

Imports to Crete from the Aegean included the attractive stones, *antico rosso* and *lapis lacedaemonicus* from Laconia, much favoured for the manufacture of bowls and lamps. The white-spotted obsidian from Giali was used for the same purpose. Emery was certainly utilised in Crete for the manufacture of stone vases, and analyses are in progress which may determine its origin (Warren 1967a, 52; cf. Oosterom 1968). Although the best known sources of this material are in Naxos, it is widely distributed in the eastern Aegean (cf. the map given by Önay 1949): it was certainly not locally obtainable in Crete.

The overseas connections do not reflect this preponderance of Minoan influence so clearly as might have been expected. Four Minoan sherds are published from Lipari (Taylour 1958, 16), but these are the sole Minoan exports in the western Mediterranean that have been positively identified from this or indeed any period. Mycenaean contacts, following early indications in Middle Helladic times, were much closer. Taylour lists 39 sherds of Mycenaean I or II date from Lipari alone, and clearly Mycenaean influence in the western Mediterranean, or more precisely in the Aeolian islands, was considerable. The amber trade, which had already begun, was apparently carried on principally by Mycenaean.

In the east Mediterranean the situation is analogous: only a few pieces of Minoan pottery have been found—at Sedment and Tell el-Amarna in Egypt, at Ashur in Mesopotamia—and a silver bowl with Minoan Linear B markings in Syria (Pendlebury 1939, 223–25). Mycenaean pottery is now more widely distributed in the Levant and Egypt: in Egypt Mycenaean pottery is more numerous than Minoan by the ratio of 8 : 1 (Stubbings 1953; Wace and Blegen 1939).

Two important sources of evidence greatly extend our knowledge of Aegean trade in this early phase of the late bronze age. First there are the bronze ingot bars, the so-called 'oxhide' ingots which are widely found in the Aegean and beyond (figs. 20.6 and 20.7). The earlier form, Type I, is dated to around 1500 BC and is found chiefly in Crete, most notably at Aghia Triadha. The overall distribution of the various forms of ingot bar, including the types more frequent in the fourteenth and thirteenth centuries, suggest a trade in metal from Cyprus and possibly from Sardinia to the Aegean world (Buchholz

1958, 95). Here now is the first direct indication of a regular trade in large quantities of a raw material.

A second and very remarkable insight is afforded by wall paintings in several Egyptian tombs illustrating 'tribute-bearers' in recognisably Aegean dress, bringing offerings both of bronze bars and of finished objects, some of them of Minoan type (Bass 1967, 64). The most informative of these are in the fifteenth century tomb of Rekhmire, a court official at Thebes, where the 'chiefs of Keftiuland (and) the islands which are

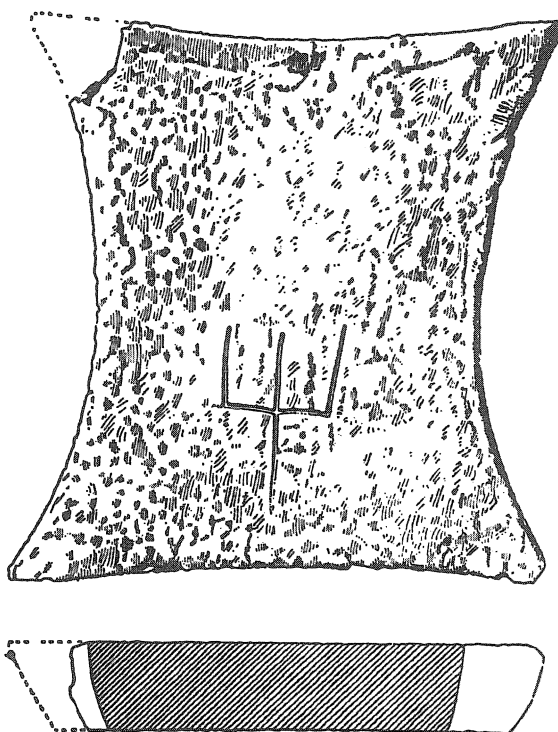


FIG. 20.6 Copper ingot (type I), inscribed with Minoan Linear A sign, from the hoard at the Late Minoan Little Palace at Aghia Triadha, Crete (*after Evans*). Wt c. 29 kilos.

within the Great Sea' bring bars and vessels including a Minoan rhyton. These scenes give a vivid and unexpected glimpse of the reality behind the rather scanty distributions of pottery which normally provides all our information.

Imports to Crete at this time included a number of alabaster vases, buried with the occupant of the Royal Tomb at Isopata and in a rich Late Minoan II tomb at Katsamba. The impact of Egyptian contacts is obvious in the art, where papyrus motifs and monkeys are notably popular subjects.

The fourteenth and thirteenth centuries BC, the Late Helladic IIIA and B periods, were a time when Mycenaean influence in the Aegean was predominant. After the 'fall' of Knossos around 1400 BC, the Minoan finds at settlements such as Phylakopi in Melos or Aghia Irini in Kea were replaced by Mycenaean ones. At Trianda in Rhodes the Minoan

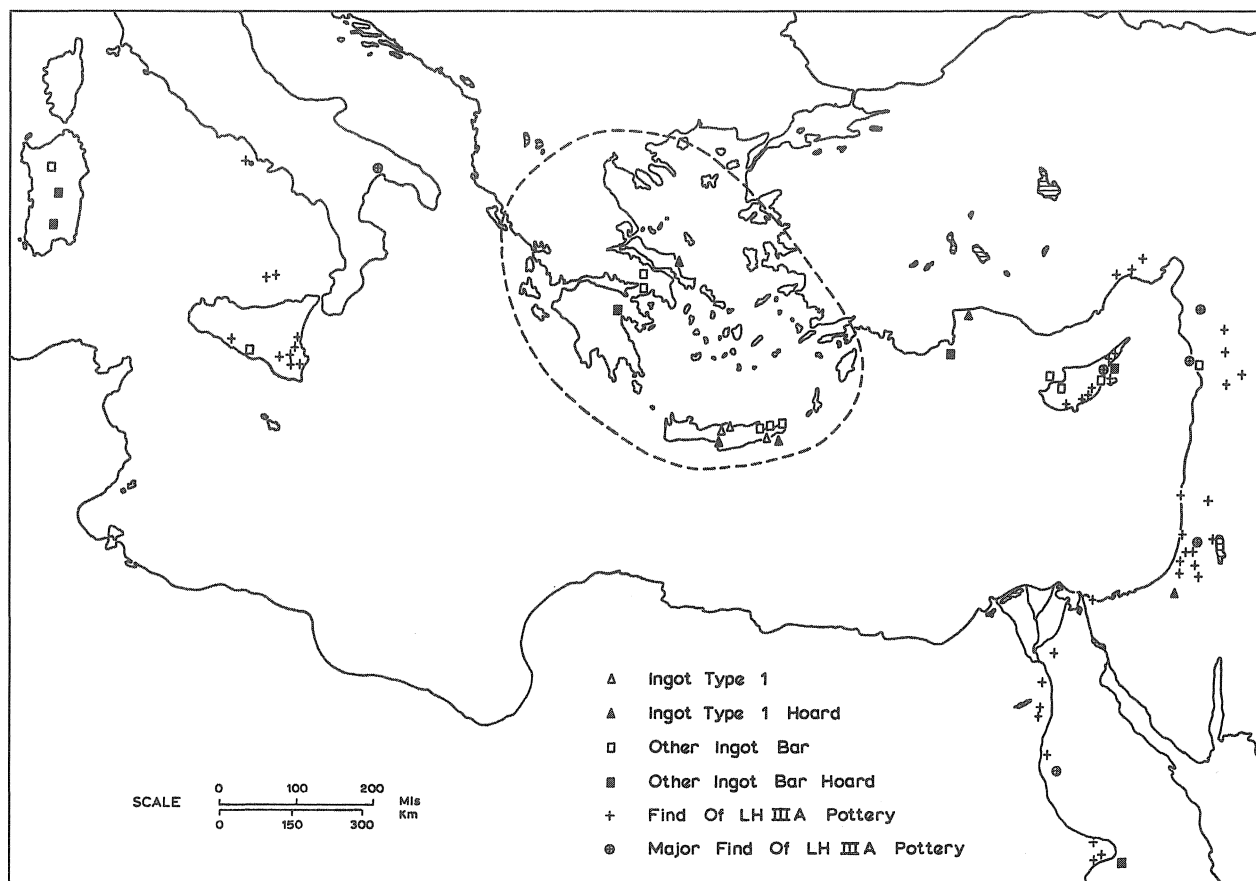


FIG. 20.7 Commercial trade in the fourteenth century BC. The map indicates the distribution of finds in the Mediterranean of late bronze age ingot bars of copper, and of Mycenaean (Late Helladic IIIA) pottery. LH IIIA pottery is commonly found within the area indicated by the ellipse. Directional trade may be assumed for those sites with major finds of LH IIIA pottery (Scoglio del Tonno, Enkomi, Tell Atchana, Ras Shamra, 'Ain Shems and Tell el Amarna).

settlement was deserted, and the Mycenaean settlements of Rhodes, founded shortly before this time, increased greatly in prosperity.

Mycenaean pottery was now common in Sicily, the Aeolian islands and in southern Italy. A single sherd was found in Malta, but none has been reported further west. The bronze ingots of Sardinia may be of this date.

In the east Mediterranean Mycenaean pottery was of widespread distribution in the Late Helladic IIIA and B periods (fig. 20.7), sometimes in considerable quantities. Much of it was manufactured in Cyprus, where pottery almost indistinguishable from that of the Mycenaean homeland was now being produced. At Tell el-Amarna 1,350 sherds have been found, perhaps representing 800 complete vessels. More than 500 of these sherds were from 'pilgrim flasks', i.e. two-handled bottles. Of the 59 other finds from Egypt recorded by Stubbings (1951, 90 f.) 48 were stirrup jars, 5 pilgrim flasks and 2 were bottles. The dominance in Egypt of closed shapes capable of being stoppered is very striking, and olive oil was probably the commodity most frequently traded (*ibid.*, 101) although opium may have been another (Merrillees 1962).

Knowledge of the bronze trade has been greatly advanced by the undersea excavation of the late thirteenth or early fourteenth century merchant ship wrecked off Cape Gelidonya in south-west Anatolia, with a cargo of ingots (Bass 1967). There were 'ox-hide' ingots of copper, bun-shaped ingots of bronze, and a supply of metallic tin. The finds suggest that this ship, doubtless sailing from Cyprus to Crete or Greece, may have been manned by a Levantine rather than an Aegean crew. It gives a vivid insight into the commercial trade of the time.

Trade Mechanisms in the Prehistoric Aegean: Internal Trade

This brief review of the indications for external trade, that is to say trade with destinations outside the respective cultural territory, now permits a consideration of the actual trading mechanisms involved. First of all, however, it is essential to consider the archaeologically more difficult topic of trade within the village unit, and trade between such units, inside the area of a particular culture, here designated internal trade. Such trade may have been greater in bulk and in economic importance than any with more remote lands.

Anthropological research indicates that in general the nature of the trading mechanism varies both with the kind of commodities exchanged and with the spatial scale of the exchange. Some general observations on exchange in non-monetary economies are helpful in setting a feasible context for the prehistoric Aegean.

Inside the residence unit of a non-monetary economy a situation normally holds which Sahlins (1965, 147) would term 'generalised reciprocity'. Transactions are altruistic, 'pure gifts', giving and receiving are virtually independent processes both embedded in a framework of obligations and responsibilities. There is no attempt to balance the flow of goods between individuals.

Within a village or tribal group, especially in economically less complex societies, the transfer of goods inevitably takes place between individuals who are in a social relationship one to another, if only as fellow members of the tribe. The mechanisms of exchange are not then generally 'commercial', involving barter, haggling or other ways of driving a hard bargain. Such activities are often reserved for negotiations with strangers outside the social unit. Inside, exchanges are frequently effected by mechanisms less openly commercial, such as gift exchange, where the precise nature and quantity of the gifts is, at least formally, less significant than the relationship which they strengthen. This is

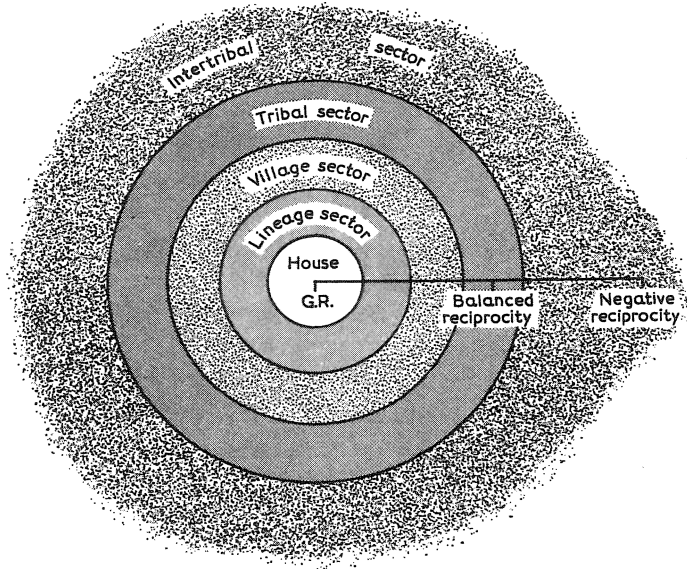


FIG. 20.8 Reciprocal trade: the change in the nature of the reciprocal exchange as the distance (in terms of space and of kinship) between the trading partners increases. G.R. indicates generalised reciprocity (after Sahlins).

'balanced reciprocity'. Transactions, generally with strangers, where one hopes to get more in the exchange than one gives, are an attempt at negative reciprocity.

The distinctions already adopted in chapter 15 from Polanyi between reciprocity, redistribution and commercial exchange are useful when money-less economies, like those of the prehistoric Aegean, are considered. 'Reciprocity denotes movements between correlative points of symmetrical groupings: redistribution designates appropriational movements towards the centre and out of it again: exchange refers to vice-versa movements taking place as between 'hands' under a market system (Polanyi 1957, 250).

In chapter 15 the redistributive nature of the Minoan-Mycenaean palace economy was described, with its special arrangements for the subsistence commodities. Other

goods than foodstuffs were also involved—the palace armourers, for instance, were issued with copper—and some of these must have been obtained from outside the palace territory, since sources were not always available within it. In all this the essential social unit was clearly the palace territory or region. The modern sub-regions of Crete, for example (fig. 14.14), may correspond very approximately to the Minoan palace territories.

In discussing the use of the seal to stamp commodities in Early Minoan Crete in chapter 18, the redistributive nature of the system was inferred. There seemed no good reason to stamp goods which are to change hands directly on a reciprocal basis. Centralised storage, on the other hand, often implied in redistribution, makes necessary the recording of receipts and disbursements, first by the use of seals and ultimately of writing.

All the districts of the southern Aegean lie within a single broad geographical region, enjoying a true Mediterranean climate. There was therefore none of that broad overall regional variation in environment which promoted long-distance and interregional trade between highland and lowland Mesoamerica. There was, on the other hand, considerable local diversity, with several micro-environments, suited to different crops, within the space of a few kilometres. It was with the development of the tree crops—olive, vine and fig—that a measure of specialisation became possible. Previously the mixed farmer had been restricted to the limited range of cereals, and *légumes* and livestock. The self-sufficiency of the early neolithic farmer could now be replaced by an interdependence, based upon the transfer of goods between the differently situated farms, yet within a region perhaps only 20 or 30 km in extent. Reciprocity, the simplest of exchange mechanisms, is an unsatisfactory system when the transfers of goods are fairly large in bulk and frequent in occurrence. Clearly it was during the third millennium, when olive and vine production became widespread, that this system of exchange was replaced by one of regularised redistribution which came ultimately under the control of the palace.

Reciprocity was not of course abandoned: persons of roughly equal status in the social system doubtless exchanged gifts. Moreover the rulers of the various palaces within a culture area—in Crete, for instance, or in south Greece—probably exchanged gifts too. The material transactions between the rulers of Homeric Greece have been illuminatingly discussed by Finley (1954, 73 and 77): ‘Behind the market lies the profit motive, and if there was one thing that was taboo in Homeric exchanges it was gain in the exchange. Whether in trade or in any other mutual relationship, the abiding principle was equality and mutual benefit. Gain at the expense of another belonged to a different realm, to warfare and raiding, where it was achieved by acts (or threats) of prowess, not by manipulation and bargaining.’ This is a classic situation of balanced reciprocity.

Although the Homeric picture is not necessarily directly applicable to the Minoan-Mycenaean world, these observations do not contradict the findings of archaeology. Many of the finest valuables in the princely burials of the late bronze age may have been obtained in this way. The Cycladic bird vases in the Shaft Graves at Mycenae and in the

Temple Repositories at Knossos, to take one example, may have been acquired from the ruler of Melos in reciprocal exchange. Polanyi (1960) has emphasised that the Minoan-Mycenaean economy was without markets or any clear exchange medium. Within the Mycenaean world, as in that of Homer, transfer of goods was effected largely by redistribution and reciprocity.

Yet even within a specific culture area there must have been in addition a need for the transfer of mundane and commonplace goods between palace territories, goods which did not carry the prestige so desirable in a gift. Mineral wealth, in particular, is not so uniformly distributed in nature as are the different species of subsistence crop.

'Odyssean trade differed from the various forms of gift-exchange in that the exchange of goods was the end itself. In trade things changed hands because each party needed what the other had, and not, or only incidentally, to compensate for a service, seal an alliance, or support a friendship. A need for some specific object was the grounds for the transaction; if it could be satisfied by other means, trade was altogether unnecessary. Hence, in modern parlance, imports alone motivated trade, never exports. There was never a need to export as such, only the necessity of having the proper goods for the counter-gift when an import was unavoidable' (Finley 1954, 76.)

This Homeric picture again offers a possible model for inter-palace commerce in the Minoan-Mycenaean civilisation. The palaces may, as this picture suggests, have been so self-sufficient as not to need regular supplies, for which some institutionalised arrangement would be required. Yet it does seem likely that some form of trade in commodities, rather than in princely gifts, was conducted between the palace territories. Certainly metal, as the archaeological record shows, was a continuing requirement, and one sometimes met outside the area of Minoan-Mycenaean civilisation itself. The work of Catling and his collaborators on the chemical composition of Mycenaean pottery indicates a considerable measure of exchange within the Aegean as well as outside it (Catling and Millett 1969; Catling, Blin-Stroyle and Richards 1963). Homer's picture of a haphazard *ad hoc* series of exchanges to satisfy occasional needs portrays a mechanism hardly adequate to ensure the supply of copper which the Mycenaeans undoubtedly required, or to distribute the Mycenaean and Minoan pottery so widely found in the east Mediterranean. The nature of Mycenaean trade is discussed in a later section, but already it seems that Homer's picture does not do justice to what ultimately became a regular commercial trade, just as his description of the Odyssean palace fails to give any inkling of the orderly redistribution process in operation.

Turning now to the early bronze age, settlement territories were smaller than in Minoan-Mycenaean times. So too were the cultural units, for the Mycenaean civilisation embraced the lands of several early bronze age cultures. Once again a distinction can be drawn between the mechanisms operating over different scales of distance:

1. Trade or exchange within settlements. (Internal trade)
2. Exchange between settlements within the culture. (Internal trade)

3. Exchange with other cultural areas inside the Aegean. (External trade)
4. Exchange with regions located outside the Aegean. (External trade)

The third and fourth of these categories are discussed again in the next section. Within settlements, as we have seen, there is clear evidence from the Korakou culture and from Early Minoan II Crete that a redistribution system was in operation. The magnificence of the treasures of Troy and Poliochni suggest the same conclusion for the eastern Aegean, since such wealth can have been concentrated in the hands of a leader only through some centralising economic process. They call attention, indeed, to the particular form of redistribution which has been termed 'mobilisation', operating in the Aegean at this time and indeed later. Mobilisation 'collects goods and services into the hands of an elite ... promotes and underlines the power and prestige differences between the economic and political elite and the rest of society; the expenditure of the collected goods and commandeered services goes to implement ends defined by the elite' (Nash 1966, 32). The discussion in previous chapters documents that this was so. Indeed the real significance for Aegean prehistory of the third millennium redistributive system is that it clearly enhanced the status of the elite, the leaders, with consequences at least as important socially as they were economically.

Of the four kinds of trade listed above, exchange between settlement units of the same culture is the most difficult to detect archaeologically. Within a single early bronze age settlement, large central buildings and the use of seals and sealings can document redistribution for us. Between cultures the presence of artefacts typical of one yet found in another documents the transfer of goods. Yet inside this single cultural region the direct evidence for exchange or movement is much more limited. The uniformity in artefact types in the different parts of the culture territory makes the detection of their exchange more difficult than in the case of exchange between cultures, where the imported pieces in the artefact assemblage stand out much more clearly. We are forced to fall back on this very homogeneity of the artefact assemblage, serving to define the culture, and to conclude from it that communication brought about no doubt partly through the exchange of gifts was frequent and effective. One suspects that tribal or kinship ties within the culture would make for a balanced reciprocity, just as in Mycenaean times, rather than the negative reciprocity reserved for outsiders.

We are now in a position to summarise this general appreciation of internal trade. In the late bronze age an effective redistributive system was operating on a palace basis. This system exploited the marked diversity within localised regions in the Aegean, and was the economic basis for Minoan-Mycenaean civilisation. The relative lack of diversity between regions made exchange between them relatively of lesser importance, but some system for the organised exchange of raw materials must also have been in operation. At the same time the old, traditional gift-exchange no doubt operated between individuals within the palace territories. Clearly too the rulers exchanged munificent gifts with their counterparts in other territories.

The redistribution system may be seen to have developed during the early bronze age, when the fruitful diversity offered by the olive and vine was first exploited. Once again the basic self-sufficiency of individual settlements and regions should be stressed: only in mineral resources were there notable disparities between them. The subsistence system was largely self-sufficient, as indeed it remained until the fifth century BC when Athens gained a sufficiently effective political control of the Aegean to assure a regular and unfailing supply of grain from overseas (Michell 1957, 270).

Four Models for External Trade or Exchange

In the foregoing section the mechanisms for trade and exchange within the territory of a culture have been examined. The evidence relating to external trade in the prehistoric Aegean was reviewed in previous sections, and some insight into the mechanisms involved is now required. Here four different models for external trade are proposed, all of which seem appropriate for the trade in certain commodities at specific times in the prehistoric Aegean. The essential difference between these models is not simply the mechanism of exchange involved, but the actual distribution of traded goods which results, and which may leave indications in the archaeological record. The models are presented first in general terms, since they have a wider validity.

DOWN-THE-LINE EXCHANGE

Study of the distribution of obsidian found in the Near East, and of the quantities recovered at the various neolithic sites there, has yielded an interesting regularity (Renfrew 1969c). The percentage of obsidian in the total chipped stone industry decreases as the distance from the natural source increases. In the Near East the decrease is at first gradual: up to 200 or 300 km from the source there is still 80 or 90 per cent of obsidian in the chipped stone industry. This region, the contact zone, may be the equivalent of the culture region, and exchange within it can be regarded as internal trade. Beyond the edge of this region the percentage decreases exponentially (fig. 20.9): if the percentages are plotted on a logarithmic scale, the distribution assumes the shape of a straight line, falling off steadily as the distance from the edge of the contact zone increases (*ibid.*, 157, fig. 1). All the sites of early neolithic date in the Near East have obsidian percentages conforming, with greater or less precision, to this model. Obsidian has been found at *every* early neolithic site in the Near East known so far, although in very small quantities when the site was far from the Anatolian sources.

The exponential lapse rate has several important implications for the exchange mechanism. The very regularity of the distribution (although by no means perfect) implies that the pattern results from numerous small exchanges over a long period. The exchange seems to have been at a comparable level of intensity in many directions. Individual sites do not in general stand out as receiving unusually large quantities of material: this

argues against organised or preferential shipment. The simplest way of visualising this transfer is to postulate a chain of villages, equally spaced. Each village down the line would receive obsidian through exchange from its neighbour near the source, and pass on a given proportion, say a half or two thirds of that which it received.

The percentage y of obsidian in the chipped stone industry received at distance x down the line from the edge of the contact zone can be calculated, for a village spacing l

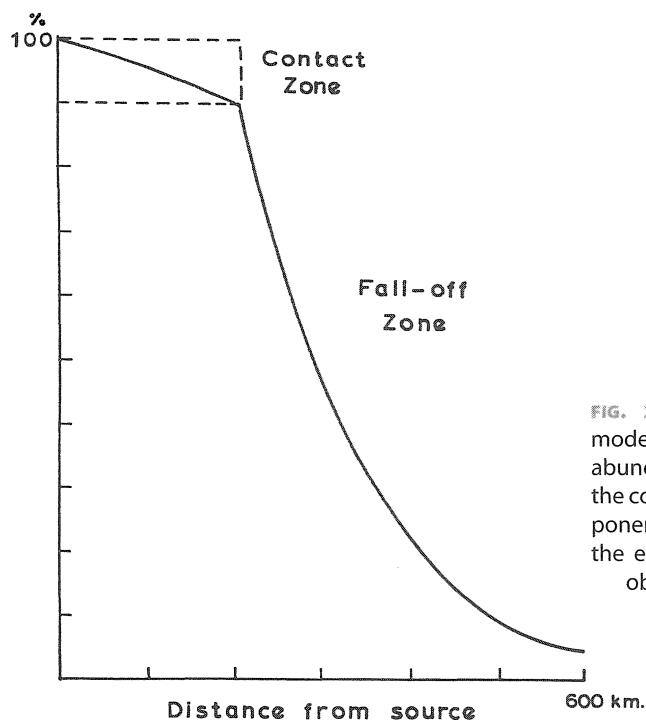


FIG. 20.9 The down-the-line trading model. The traded commodity is very abundant (maximum 100 per cent) within the contact zone; it falls off rapidly and exponentially with increasing distance from the edge of the contact zone. Example: obsidian in the neolithic Near East.

when each village passes on a proportion k ($k < 1$) of that which it receives. Under these conditions, with $N\%$ obsidian at the edge of the contact zone:

$$y = k^{x/l} \cdot N \quad \text{and therefore} \quad \log y = x/l \cdot \log k + \log N$$

This pattern, with its rapid fall off outside the contact zone, constitutes model 1. Certain properties are important: (i) The distribution is not preferentially directed: no village has a better supply than its neighbour nearer the source. (ii) The commodity, although not perishable, is consumed. The waste products resulting from its use are frequent finds.

This model, with modifications arising from sea travel, seems an appropriate one when the distribution of obsidian in the prehistoric Aegean is considered (fig. 20.1), although it offers a more effective description for exchange conducted by land than by sea.

THE PRESTIGE CHAIN

Many trading systems distinguish between articles for utilitarian ends (which implies the consumption of the articles through wear or in other ways) and objects so valuable and prestigious that to use them regularly for mundane tasks would be inappropriate. Usually anthropologists stress the difference in the prestige with which the object is invested (Herskovits 1940, 462; Nash 1966, 48). In the Trobriand islands of the western Pacific, for instance, Malinowski was able to observe a formalised *kula* trade, contrasted with the straightforward exchange of useful goods, the *gimwali* (Mauss 1954, 20). In the present context the point of especial interest is that these ceremonial or valuable objects are frequently not retained by the recipient (Herskovits 1940, 162), but ultimately passed on by him in a further 'prestation'. This ceremonial gift exchange is a special form of reciprocity.

The system may sometimes involve the ceremonial destruction of such objects at a potlatch, but more often they are passed on and leave the exchange system only through accidental loss or by burial as grave goods with distinguished dead. Even in this case they may later find their way back into the system.

The features of such exchange relevant to the ultimate archaeological distribution are:

- (i) The transfer of prestige goods often takes place chiefly between specific notable persons.
- (ii) The prestige goods are frequently handed on in subsequent exchanges.
- (iii) Such goods are not expended or utilised in daily life.
- (iv) They appear in the archaeological record either as a result of deliberate burial (generally with the dead) or through loss or accidental breakage.

We can adapt aspects of the down-the-line consumption model to fulfil these requirements. The difference here is that nearly all the goods received are ultimately passed on down the line: only a very small proportion are consumed or expended. Moreover, since such gifts may be made to more distant persons than those in the next village, the effective spacing of participants in the network is wider.

The fraction k is now closer to 1, and l is increased. The shape of the distribution is, strictly speaking, the same as in the previous case, but the fall off with distance is much more gentle (fig. 20.10).

Archaeological instances have not been studied quantitatively, but a possible candidate is the amber trade in Mycenaean times. Recent analyses by infra-red absorption has shown that the bulk of Mycenaean amber comes from the Baltic. For many years 'amber routes' have been recognised, marked by finds of amber generally in burials, across Europe (Clark 1952, 263). It is suggested here that the amber trade is an instance of the prestige chain model. Finds of amber are fairly frequent in the princely burials of the Mycenaean civilisation, and the quantities are sometimes impressively large. The mechanism could well be a chain of gift-exchange transactions stretching across

Europe. The greater material resources of the Mycenaean civilisation, and their diminished need to secure the friendship of their neighbours by gifts (partly a consequence of their peninsular position) may have facilitated the concentration of such amber finds in Mycenaean hands.

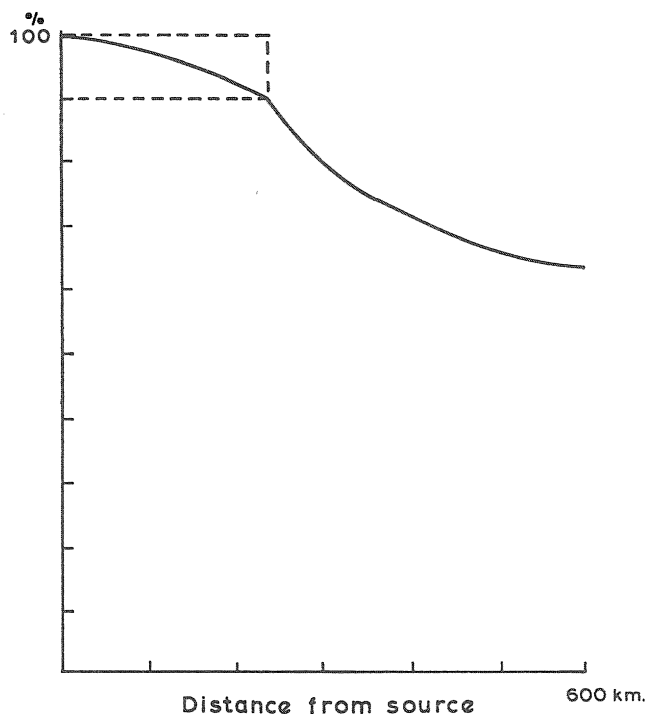


FIG. 20.10 The prestige chain trading model. The traded commodity is very abundant (maximum 100 per cent) close to the source, although for luxury commodities finds will always be infrequent. Finds are only slightly less frequent at considerable distances, up to 500 km and beyond, from the source. Examples: the kula trade, the neolithic *Spondylus* trade in Europe, the sixteenth-century BC amber trade in Europe.

The neolithic trade in *Spondylus* shells may also have been of this kind. Certainly the quantities of *Spondylus* of Aegean origin found in central Europe is much greater than the down-the-line model would predict.

FREELANCE COMMERCIAL TRADE

The previous models both involve a whole series of repeated transactions down the line. In general, unless special factors intervene, the archaeological finds of the commodities or objects in question become less frequent as the distance from the source increases.

Commercial trade does not work like that: it involves contact with strangers, often over a considerable distance, and frequently uses middlemen, intermediaries who are specialists or semi-specialists in trade. The external trade in the Aegean at the time of Homer and Hesiod was reportedly almost entirely of the freelance type (Knorrinda 1926, 2–15). Homer describes the activities of Phoenicians who were certainly specialist traders, while Hesiod's trader was a poor peasant who, during a short time of the year, took the products of the soil with him on his ship to trade with them.

The activities of such traders have certain features in common:

- (i) Goods are not usually objects of high prestige, although they sometimes may be luxury objects. They must have a wide saleability (or exchangeability) and appeal.
- (ii) The merchant operates on a freelance basis. Often he is a middleman, although in some cases himself the producer.
- (iii) Since profitable exchange is the prime motive, there is no obligation for the merchant to trade regularly with the same people.
- (iv) Such goods are very widely found within the radius of movement of the trader, and very rarely beyond. The range is largely determined by the available transport.

The characteristic distribution should thus centre upon a fairly large area where trading activities ensure a good supply. Outside this area, beyond the trader's range of travel, finds decline very rapidly in number unless some other trading mechanism comes into operation.

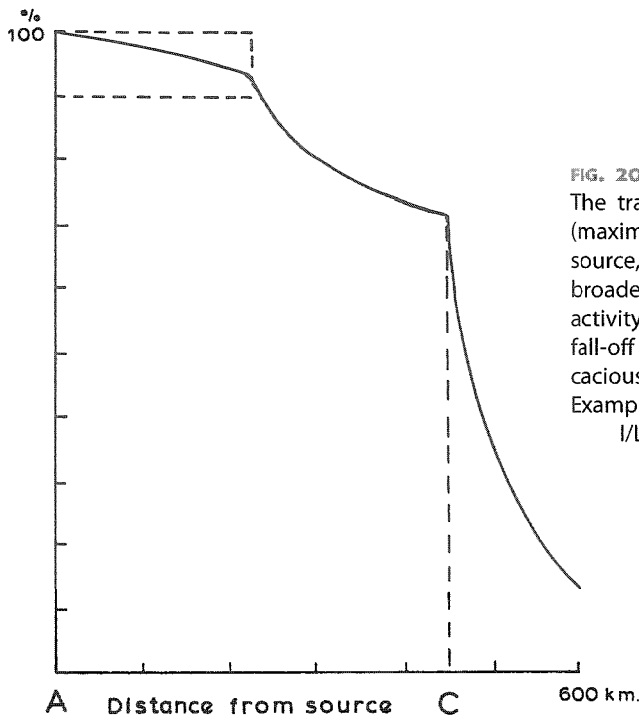


FIG. 20.11 The freelance trading model. The traded commodity is very abundant (maximum 100 per cent) close to the source, and relatively abundant within a broader zone (radius C) within the locus of activity of the trader. Outside this zone the fall-off is generally rapid as other, less efficacious mechanisms come into operation. Examples: Odyssean-Phoenician trade, LM I/LH I trade in the Mediterranean.

When sea travel is involved the distribution of finds is predominantly coastal, since the freelance seafarer does not venture beyond the coast. In this maritime case the distribution, instead of being fairly uniform over an area centred upon the home settlement, is now fairly uniform along the coastlines within his reach.

This model seems an appropriate one for the distribution of Minoan and Mycenaean pottery beyond the Aegean until the Late Helladic III phase. At this period a further trading mechanism apparently came into operation.

DIRECTIONAL COMMERCIAL TRADE

Directional trade is of a different kind: useful commodities are now transferred from the source preferentially to specific destinations. Intermediate localities, not preferentially favoured in this way, are less well supplied.

An instance of such trade, although outside the Aegean, is afforded by the Assyrian trading colony at Kültepe in central Anatolia. The metals and other products assembled there were shipped directly by caravan back to the Mesopotamian homeland. And Assyrian products are frequent there while less common at many sites nearer to Mesopotamia than is Kültepe. This trade may have been preceded at the time of Sargon of Agade by regular trading caravans (Mallowan 1965, 2), although perhaps without the existence of an actual 'colony' of Mesopotamians remote from their homeland.

Some generalisations are possible:

- (i) The goods traded consist primarily of raw materials or other useful commodities.
- (ii) The trade is carried out on a regular basis, although the merchants need not be under the direct control either of the exporter or the importer.

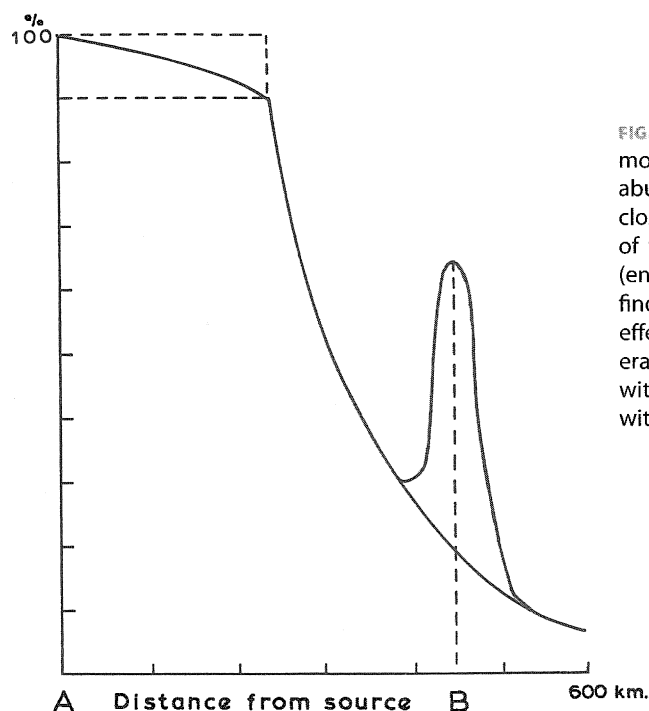


FIG. 20.12 The directional trading model. The traded commodity is very abundant (maximum 100 per cent) close to the source, and at specific ports of trade, caravan stations or 'colonies' (entrepôts, emporia). Outside these, finds are less common, as other less effective mechanisms come into operation. Examples: the Assyrian trade with Kültepe, the Cretan metal trade with the east Mediterranean in the late bronze age.

- (iii) Specific sites at considerable distance from the source are well provided with goods, while others nearer to it are less well supplied. The distribution is no longer a symmetrical one.

When a distribution of this kind is found it implies the regular transference of goods from A to B, usually taking place on several occasions. The transport need not necessarily be direct: the goods can pass from A to B through intermediaries. Nor need it be directed, in the sense of being controlled by a single political organisation. But it is directional: some areas systematically receive goods, others do not. Freelance trade can, of course, develop into a pattern of this kind, when the same destination is habitually visited to the exclusion of others.

The distribution of Mycenaean pottery in the Late Helladic IIIA and B periods, where particular sites such as Scoglio del Tonno or Ras Shamra were particularly well supplied, seems to document directional commercial trade. The same model would apply to the supply from Cyprus to Crete of bronze oxide ingots, which were clearly the subject of regular directional trade of this kind.

The Development of Aegean Trade: Conclusions

With the aid of these four models a more complete picture of early Aegean trade can be built up. This is useful when the role of trade in the formation of Aegean civilisation is considered. A comparison of these models with the data available makes clear, in particular, the limited extent of commercial trade in the third millennium Aegean.

In the neolithic period trade within cultural territories was doubtless widely carried out on a basis of reciprocity. The traffic in Melian obsidian, already by 7000 BC, involved the initiative of individuals who went to Melos to fetch it. On land, from Thessaly northwards and from the Aegean coast of Greece westwards, it was traded by a down-the-line mechanism analogous to that operating in the Near East.

The trade in *Spondylus* shells was of a different kind. These were traded from the north Aegean, by means of what may be described as a prestige chain. Durable, and removed from the exchange system only by burial, they were traded northwards by a series of gift exchanges, perhaps between tribal leaders, as objects of value. There is no evidence of other trading contacts outside the Aegean.

During the third millennium, and specifically in the Early Bronze 2 period, the greater diversity in products (notably oil and wine) within individual territories favoured the development of a redistribution system, best documented in Crete and southern Greece.

At this time contact between cultures became much more frequent. In addition to the traditional obsidian trade, metal objects and possibly the raw metal itself were transported. The mechanism of the exchange is uncertain. Some of the more impressive finds—such as gold plate—may represent gift exchanges between leaders. The

widespread distribution of daggers, however, suggests that what I have called freelance trade now began. Much of it may have been carried by the Cycladic islanders. The only suggestion of a directional commercial trade at this time comes from the Minoan 'colony' on Kythera. One imagines, however, the owners of the Cycladic longships setting out for adjacent islands in the summer months, much as Hesiod describes (Knorringa 1926, 13), taking with them the finished metal objects, or marble bowls and figurines, and returning with raw metal (tin perhaps), and perishable products such as hides or even slaves. With freelance trade came freelance piracy, just as in Homeric times (*ibid.*, 9).

At this time contact between Crete and the east Mediterranean began. Ivory was the favourite import, and perishable materials, no trace of which has been preserved, may have been exchanged. The distances involved are so great that no casual down-the-line mechanism can be invoked, and since the Levantines and Egyptians were strangers, no social links initially existed which required supporting by gift exchange. Freelance trading activities seem the most likely explanation, since official expeditions were perhaps not already launched at so early a date.

Whether the mariners were Minoan or Levantine is difficult to determine. Again one thinks of Hesiod's farmer taking his ship in the summer months for a brief and profitable expedition to the Levant. Since sailing ships may not yet have been available, he may have had to call upon his friends to make up a crew of oarsmen. The rather casual enterprise of Jason and the Argonauts, although not directed at the Levant, and with an intention to seek plunder as well as to exchange goods, may have worked on a very similar basis.

Much the same picture will serve for the middle bronze age, although the Egyptian statue at Knossos and the alabaster lid with the pharaoh's cartouche suggest that persons of higher rank may have exchanged both visits and gifts. The bulk of the finds—beads and scarabs in Crete, and pottery widely seen in the east Mediterranean—suggest a steady background of unambitious freelance trade.

The significant advance in the late bronze age was the emergence of a systematic trade in raw materials, as the finds of ingots document (fig. 20.6). This may well have been organised on a palace basis—it was no casual exchange of trinkets, but an organised supply of an essential commodity. In the Late Bronze 1 and Late Bronze 2 periods the only clear evidence for directional trade is afforded by the Egyptian tomb paintings, and as Bass points out (1967, 74) only in that of Rekhmire can the ingot bearers positively be identified as Cretan. Much of the trade may have been in Levantine hands. Of course the notion of 'tribute' was a polite fiction. Necessities such as metal, required on a regular basis, were the object of commercial trade. No doubt the formalities were arranged in terms of a gift-exchange, masking the commercial nature of the transactions. The alabaster vessels at Knossos and Katsamba may have been obtained in this way. In any case, the Aegean seems to have been an importer rather than an exporter of metal. That ivory was still among the most favoured imports is documented by the tusks found at the palace of Zakro.

The Mycenaean trade with the Aeolian islands should probably be seen as freelance trade, although it could also be regarded as a palace-based directional trade. The supply of amber from the Baltic, on the other hand, probably came down a prestige chain at least as far as the Adriatic, just as *Spondylus* shell earlier was carried northwards. From Italy the amber was brought to Greece by freelance Mycenaean traders, even if they obtained it by what in formal terms was the exchange of gifts. No doubt the reciprocity was as negative as they could make it.

Not until the Late Bronze 3 period does the distribution of exported finds clearly indicate a commercial directional activity. A steady supply of copper was reaching the Aegean from Cyprus—whether carried by Aegean or Levantine bottoms—and Mycenaean finds in Cyprus are exceedingly abundant.

The most striking features of the pottery distribution do now suggest a directional trade. In the first place certain sites, notably Scoglio del Tonno near Taranto in Italy and Atchana, have yielded notable concentrations of Mycenaean pottery. Clearly they were receiving preferentially. Moreover the pottery at different sites is of a different kind: at Amarna the dominant shape was the ‘pilgrim flask’, at some other Levantine sites the stirrup jar was most frequent, while in the west the three-handled piriform jar is much more common. Oil was evidently exported to the Levant, but not in significant quantities to the west Mediterranean. This is the first indication that an *export* trade was organised: not until the fourteenth century BC is there evidence that home production was effectively harnessed to yield export commodities.

These conclusions caution against too expansive a view of prehistoric trade in the Aegean. It was never a commercial trade in the modern sense, and the production of goods for the export trade can never have played a very major role in the Minoan or Mycenaean economy. The real problem, in Aegean terms, was to secure necessary *imports*, principally metal, and also ivory and perhaps various perishable commodities.

As Starr has written (1955, 283): ‘The overwhelming bulk of the population of the ancient Mediterranean was committed always to wresting a living from the soil, for the surplus of food which the farmers raised could support but a small percentage of the local population in industry and commerce; only in the modern developed economic system could urban agglomerates arise which were not fed from the immediate countryside. To these basic facts Minoan Crete was no exception. The splendour of its palaces rested mainly upon the work of farmers, and the Cretan artists were fed from Cretan farms.’ The palaces indeed testify to a large redistribution operation for local produce: there is no evidence that the overseas trade handled a comparable bulk of material. Indeed the only obvious essential commodity not available in sufficient quantity locally was metal.

Pirenne’s ‘mercantile settlement theory’ for the emergence of urban centres must in this case be rejected in favour of a modified ‘market theory’, where local trade provided the stimulus for urban growth (Benton 1968, ix)—with the important modification that this local ‘trade’ was in reality a redistribution exchange. Even a supposed Minoan ‘colony’ like Phylakopi in Melos can have had little to offer Crete that was not available

at home: its own speciality, obsidian, had declined in importance before Minoan influence in Melos reached its peak. The notion of a considerable Minoan (or Mycenaean) sea-power, of a war fleet, a thalassocracy of Minos, is certainly exaggerated. Minoan-Mycenaean prosperity was based primarily on home production, distributed through the palace, on home territory.

Innovation in the Third Millennium BC

The foregoing discussion is a necessary preliminary for any serious consideration of innovations and acceptance of innovations in the third millennium Aegean. The limited extent and importance of trade at this time, are observations fundamental to the understanding of the origins of Aegean civilisation. Yet at the same time the Cretan contacts with the Levant and with Egypt were fairly frequent, if irregular, and certainly a potential means for the transmission of ideas and innovations.

Childe's notion of the diffusion of civilisation from the Near East to the Aegean rested upon the view that Mesopotamian entrepreneurs in the Aegean organised there a supply of raw materials for the expanding civilisation of Sumer. In return the Aegean would have received Sumerian finished products and Sumerian know-how, which over the years would have effected a radical transformation in the Aegean way of life. This is a trading model, borrowed indeed from the colonial developments of recent centuries where elements of western civilisation in various parts of the world were acquired as the result of trade. Fundamental to such a model is this notion of a commercial trade of sufficient scale to constitute a major element in the economy of the region thus being 'civilised'. As we have seen, at no time in the prehistoric Aegean was there a commercial trade of this scale, and certainly not during the third millennium BC. Moreover the limited commercial trade of the Aegean late bronze age had as one of its prime objectives the *acquisition*, not the disposal, of an essential raw material: copper. The Mycenaeans were apparently importing raw materials, and exporting manufactured commodities such as perfumed oil and textiles. This is almost the converse of the model which Childe put forward.

The impact of the overseas trade in the third millennium seems to have been limited in Crete largely to the suggestion of new decorative motifs for the seal engraver. Metallurgical influences have not been recognised until the beginning of the middle bronze age (Branigan 1966a; 1967b), and perhaps not until the late bronze age are Egyptian and Levantine ideas widely seen in artistic decoration. Neither economically nor in the terms of the flow of ideas does the trade with the east Mediterranean appear very significant in the third millennium BC. To say this is not to underestimate the effects of stimulus diffusion, or to deny that various specific innovations were suggested by these contacts. But even in the late bronze age, when the links were certainly much stronger, the major developments may have been locally determined. Graham (1970, 238), speaking of the architecture of Late Minoan Crete, effectively makes this same

observation, finding 'no good reason to see strong formative influences from a culture outside the island itself affecting the architecture of the palaces of Crete at any stage in their development.... But the imposition of isolated luxury trappings, such as details of decoration, or such splendid features as monumental reception or banqueting halls, is not only possible but likely.' This distinction is an essential one, and it applies with still greater force to the early bronze age.

The major economic changes in the third millennium, as we have seen, were the development of a redistribution system operating within local sub-regions, and a growing desire for goods, especially metal goods. The increased flow of ideas came about through increased contacts *within* the Aegean, not outside it.

Here is the crux of the matter. In neolithic times each region of the Aegean was essentially self-sufficient, except perhaps for the requirement of a little obsidian; the cultural identity of each was unique. By the Late Helladic IIIB period the Aegean had become culturally, although not politically, almost a unity. This change came about not by conquest or commercial domination by the Near East but through the flow of ideas within the Aegean, resulting from the contacts and the trade of the time. Two stages in this process may be discerned: the first was in Early Bronze 2 times, when, for the first time, the Aegean evolved a measure of unity, if only in the field of metallurgy. The second was in the late bronze age when first the Minoanisation of the mainland, and then the Mycenaean influence on Crete, produced a notable degree of uniformity.

The first of these changes, which particularly interests us here, was associated with the rise of metallurgy, and the widespread distribution of the metal types has already been discussed. The colossal impact of this new commodity can be seen most clearly in other media. The pottery *depas* cup and the pottery 'sauceboat', two of the most common forms of the period, imitate metal prototypes (pl. 19; Renfrew 1967a, 16). The same is true of the jug. Even the marble folded-arm figurine of the Cyclades may imitate a form first seen in metal (Renfrew 1969a, 31). The widespread distribution of these forms as well as of the metal types themselves testifies to the impression which metallurgy made at this time. Such cultural homogeneity as then emerged, and it was still very limited during the third millennium, was the consequence of the new interest in metal and the contacts which this brought about. These contacts doubtless came about through the exchange of gifts, and through freelance trade, which, like piracy, now began. These were processes of Aegean origin, taking place primarily within the Aegean.

Chapter 21

The Multiplier Effect in Action

Aegean civilisation emerged as a result of processes at work throughout the third millennium BC, culminating in the palace principalities of Greece and Crete in the second millennium. In preceding chapters the growth in various fields of activity, in the subsystems of the culture system, has been reviewed. Our task now is to seek some further understanding of this process, to explain (in this sense) the emergence of Aegean civilisation.

No single cause or factor can furnish a sufficient explanation. Some authors have identified irrigation as the fundamental basis for various early civilisations (e.g. Wittfogel 1957) yet the foregoing discussion suggests that neither this, nor the invention and exploitation of metallurgy, nor yet the adoption of a redistributive system for agricultural produce can be singled out as the primary determining feature. Nor does population growth in itself explain very much. An adequate explanation can come only from the study of interactions of the various subsystems of the culture. A general model was outlined in chapter 3 for this purpose, and a particular kind of interaction, the multiplier effect, identified as of crucial significance.

In this chapter the rise of Aegean civilisation is viewed as a specific instance, a rather well-documented example, of a more general process for which the multiplier effect helps to furnish an appropriate model. First, however, it is necessary to re-state the fundamental preliminary conclusion that Aegean civilisation was not brought ready-made to the Aegean, nor transplanted either by migration or diffusion from other lands.

Aegean Cultural Autonomy

The migration theory for the origin of Aegean civilisation is altogether untenable. This is not to deny that movements of population did occur on a limited scale, at the time in question. Clearly, however, the immigrants did not bring with them their own formula for civilisation and then proceed to implement it in the manner suggested by the adherents of the 'heliolithic' explanation for the origins of Central American civilisation.

The possible indications for population movement were discussed in chapter 4, and some of the resemblances of form in chapters 13 and 20. The following points have admittedly not yet been explained satisfactorily on the basis of trade or other forms of culture contact:

- (i) The broad similarities between the Macedonian early bronze age and the Troy I culture. This may imply the arrival of immigrants from the Troad, but an explanation in terms of stationary contact seems more plausible.
- (ii) Similarities in the pottery of the Grotta-Pelos culture of the Cyclades and that of Kum Tepe Ib in the Troad. The differences in other elements of the material assemblage warn, however, against exaggerating the importance of this ceramic affinity.
- (iii) The Cycladic appearance of some of the grave goods in the cemetery at Iasos in Caria.
- (iv) Analogies in some of the pottery forms of Early Minoan I Crete with those of west Anatolia. They need not, in the present writer's view, indicate more than peaceful contact.
- (v) The apparently sudden appearance of the Tiryns culture in south Greece. No suitable 'homeland' has yet been found for this assemblage, and further work in south Greece may yet reveal a local evolution.
- (vi) Clear north-west Anatolian affinities of the Lefkandi assemblage in Euboia and the Kastri group of the Keros-Syros culture. Evidently there are many Anatolian forms in the northern Cyclades and in Euboia during the Early Bronze 3 period. In this instance alone the evidently 'foreign' appearance of a good proportion of the assemblage suggests that small groups of immigrants may have travelled from north-west Anatolia and settled in these restricted areas.

Against these possibilities of population movement should be set the clear evidence of continuity in almost every region, and the very distinctive identity which each culture possessed and did not lose until later in the bronze age. While limited movements of population may have occurred within the Aegean, there seems no good evidence for the arrival in significant numbers of immigrants from outside at any time after the inception of the Aegean early neolithic.

Even accepting that some of the apparent discontinuities do in reality reflect movements of people, there is absolutely nothing here to explain or to help explain the emergence of civilisation. None of the points of departure at the time in question was the home of a civilisation. Indeed the whole problem of establishing the existence and nature of these minor population changes seems entirely irrelevant to that of explaining the emergence of civilisation.

The diffusionist theory, as outlined in chapter 4, suggests that civilisation came about in the Aegean as a result of strong contacts with Egypt or the Near East. Contacts within the Aegean are not strictly relevant to the theory since they do not document the

receipt of new ideas or processes from outside the Aegean, the fundamental issue for this theory.

The diffusion view implies some radical changes within the system following the introduction of new customs (and artefacts) from outside. Childe's view of the transference of civilisation, to secondary and tertiary centres, implies the adoption of a whole series of innovations in a relatively short space of time, most of these being activity patterns already well established in the primary centre. He described this process of acculturation by diffusion as it supposedly occurred at Byblos and in Cappadocia:

'At the same time, excavation reveals townships growing into cities dependent on industry and trade. Metal becomes common, pots are manufactured on the wheel by professionals instead of being built up by the housewife. Mesopotamian devices are borrowed to meet the requirements of the new economic situation. The cylinder seal is adopted as a means for labelling property and signing documents. Soon the Babylonian script is adapted to transcribe the local languages. But Cappadocian civilisation, like the Bible, preserved its local peculiarities. And again the borrowed elements were developed more slowly than in Mesopotamia. The local seals, for instance, go on repeating designs a thousand years after they had gone out of fashion in Babylonia' (Childe 1936a, 172).

The essential point here is that a whole constellation of striking innovations should be seen, nearly all of them traceable to a specific primary centre. The culture retains certain traditions and a local individuality, but the new activities of the time are mainly adopted from outside.

This is a splendidly plausible model, and one that is doubtless applicable to various civilisations at different times. But the evidence reviewed in chapter 20 does not support its relevance in this case. As we have seen, trading contacts in the third millennium with Egypt were few, and with the Near East even fewer. There are indications of a directional trade for the first time in Mycenaean times, when Aegean pottery is widely found in the east Mediterranean. So that, while a freelance commercial trade between Crete and the Levant or Egypt was probably beginning in the later third millennium, its economic significance cannot have been great. The local redistribution of foodstuffs and other goods must have taken place on a very much larger scale. The economic effect on other regions of the Aegean of any trade with the east Mediterranean was quite negligible. Undoubtedly the Cretans profited by these contacts to pick up new ideas, which are hinted at in the art of seal engraving and perhaps in their love of stone vases. The fundamental changes of the time, in the social, subsistence and craft subsystems, do not, however, appear as the result of east Mediterranean contact. They are seen in other regions of the Aegean where such contact was lacking. Indeed the contacts within the Aegean, between its various regions, seem both economically and in terms of the flow of innovations, to have been more important.

This conclusion does not reject the wide range of innovations in many fields which, especially in Crete, may have been adopted through contact with the Near East and

Egypt. Their study and assessment remains one of the central tasks of prehistoric Aegean archaeology. It does, however, deny them the determining importance for the origin of Aegean civilisation which some writers have suggested. The Aegean was continually in receipt of ideas and of goods from overseas, but essential transformations in Aegean society leading to the emergence of civilisation must be viewed principally in Aegean terms. It is to this task that we now turn.

Alternative Models for the Rise of Aegean Civilisation

Already we have seen how different authors set specific processes or advances at the centre of their 'explanation'. Wittfogel and, to a lesser extent, Childe stressed the importance of the subsistence mode, and specifically of irrigation (Wittfogel 1957; Childe 1963a). Boserup (1965) awarded to population density a determining role in the growth of culture, while certain others have followed a rigid environmental determinism. The present author has elsewhere emphasised, indeed exaggerated, the central role of trade in the genesis of Aegean civilisation, while the central importance of the means of production would be underlined by some Marxist writers, so that the development of craft technology, and notably of metallurgy, might by them be given pride of place. Many authors today would stress above all the social changes occurring, notably the emergence of a hierarchy (Adams 1966), while some would see the developing 'style' of the civilisation with its accompanying system of beliefs and its artistic mode of expression as a central attribute (Frankfort 1951).

Most suggested explanations for culture change occurring within a society proceed either by proposing an analogy—a pattern recognisable elsewhere which can illuminatingly be applied to the problem in hand—or by indicating a mechanism, usually a causal chain, whereby a given postulated change of some kind can yield a whole series of consequences corresponding to those actually observed in the archaeological record.

A good instance of the ethnographic analogue model is afforded by Kent Flannery's discussion of the significance for the Oaxaca region of Mexico of its contacts with the Olmec culture of the Gulf Coast area in the Formative phase of its development (Flannery 1967b). An analysis of Olmec influence indicated that 'one of the main mechanisms of communication between the two regions was through the exchange of exotic raw materials'. Flannery then chose two well documented trading systems of recent times, the Tlingit fur trade and the Highland Burma jade trade, and using illuminating analogies with these, was able to reach a plausible understanding of the nature and effects of the Olmec-Oaxaca trade in the Formative period. In such a model the initial situation is always a complicated one, but broad similarities in the structure and the functioning of the different societies in question may be discerned. What it may sometimes lack in generality is counterbalanced by the fine level of significant detail which such comparison affords.

An effective instance of the causal chain explanation, in this case for neolithic origins, is afforded by Lewis Binford's stimulating article, 'Post-Pleistocene Adaptations' (1968b). He showed persuasively how a shift to the exploitation of highly seasonal resources, such as migratory fowl and fish, was accompanied at the end of the Pleistocene by an increase in sedentism and hence of population growth. Emigrant colonies from the more sedentary group would create a 'tension zone' where the population density balance of less sedentary groups would be disrupted. There would consequently be strong selective pressure favouring the development of more effective means of food production. Such pressure would favour the initial practices of cultivation, both of plants and of animals.

This explanation is of a very satisfactorily general kind, predicting parallel and independent innovations in different parts of the world at this same time. Like all causal chains it has a beginning, a *déclanchement*, a significant initial and independent event which activates the sequence. Here it is the shift to the exploitation of highly seasonal resources, a shift viewed ultimately as exogenous in origin to the culture systems themselves, since it is 'probably linked to worldwide changes in sea level'.

In such explanations there is often opportunity to wonder what caused the cause.

Several models of both kinds could be constructed for the Aegean culture changes observed. Here two alternative versions of the causal chain explanation are outlined. Both are, I think, plausible, and based upon the evidence now available.

Subsistence / Redistribution Model

In terms of this model the decisive factor for the development of Aegean civilisation was the development of a redistributive system for subsistence commodities. This emerged as a consequence of the intensive exploitation of a new spectrum of food plants, notably tree crops, yielding a new diversity in produce.

GENERAL STATEMENT

Adaptive transformations in human societies may be of three kinds. In the first there is a shift in the spectrum of environmental resources exploited: the exploitation of new resources and the more intensive use of certain traditional ones implies at the same time the reduction or cessation of exploitation of other resources. The most obvious example is the shift from hunting-gathering to food production. Another would be the replacement of stone tools by those of metal. The change in exploitation pattern is often accompanied by a shift in settlement pattern.

A marked increase in the efficiency of exploitation of a given range of resources is a second recurrent cause of societal transformations. In this case traditional resources are not abandoned, nor new ones utilised. The advance is in the field of exploitative efficiency, giving a greater per capita yield to the worker. Most subsistence advances are of this kind: irrigation agriculture is perhaps the most striking example.

A third transformation type is the effective enlargement of the range of resources successfully exploited. The traditional resources remain basic, but they are supplemented now by new ones. The first consequence is a new diversity in the range of products. Moreover if the resources in question are not competitors for land or for human labour, an increase in net production is possible. This increased production may permit a rise in population. More significantly the diversity in food products leads both to greater security (in that the failure of one crop need no longer be disastrous) and to some measure of specialisation in production. Some system of exchange is needed to utilise the specialist products. In favourable circumstances—and this depends largely upon the spatial distribution of the various resources—a redistributive system emerges in which the transfer of goods is centrally controlled. This is the locus for an emerging hierarchy of power and of wealth. This third transformation type is relevant to Aegean developments.

ANALOGY

An instance of a transformation of this third type is afforded by Formative Mesoamerica, where several micro-environments are available (Flannery and Coe 1968). While one response is the intensive exploitation of one micro-environment, another is the exploitation by villages located in each, even in those regions which taken alone could not support a self-sufficient village. Permanent settlement is achieved by means of co-operative specialisation. The social correlates of such an adaptation appear to be a redistributive system, and its control by persons of high status.

INITIAL CONDITIONS

By 4000 BC mixed farming was successfully conducted in every major region of the Aegean. The chief product was grain—wheat or barley—and the fertile plains of northern Greece in particular were intensively farmed. The distribution of tell sites (fig. 15.2) emphasises the intensity of exploitation of suitable arable land. Other settlement types naturally used other resources, especially in south Greece—the fishing village of Saliagos is an example—but such settlements were fewer and smaller. Thus while several micro-environments were exploited, fertile arable lands were preferred and most intensively cultivated. There is little evidence for craft specialisation or for a strong hierarchical social structure. Trade was on a limited scale on the basis of reciprocity.

CAUSAL FACTORS

1. It is suggested that the domestication of the vine and especially the olive early in the third millennium BC made possible the intensive exploitation of a new micro-environment—the hill slope below 700 m, receiving abundant sun, little rain and no winter frost.
2. The terrain in south Greece is such that a single village can be within reach of both arable land and of hill slopes suitable for olive cultivation and viticulture. The

suggested consequence is that a redistributive system emerged *within* the village, favouring the emergence of local chieftains.

A rise in population is expected, since the olive and vine do not compete for land with the cereals, and require labour at periods other than those critical for agriculture.

3. The concentration of commodities for redistribution in the hands of the central 'chief' favours a development at the same spot of specialised services for the community: the smiths and other specialist craftsmen are organised by the chief and live near him. The increased village population reaches the threshold level to support craft specialists. A nucleus of craft specialisation thus occurs at village level in what is still basically a subsistence economy.

AEGEAN DEVELOPMENT

1. The domestication of the vine was accomplished in the Aegean by the third millennium BC, as the evidence from Sitagroi shows. Finds of olive oil and olive stones from early bronze age Crete and the Cyclades, and the use of oil lamps, document the exploitation of the olive. The adoption of Mediterranean polyculture at this time is strongly suggested by the new distribution of settlements in the southern Aegean (fig. 18.12), in areas of true Mediterranean climate.
2. Settlement survey indicates a marked rise in population throughout the southern Aegean at this time, while in the north, where olive cultivation is less easy, population apparently increased more slowly.

The use of seals and sealings graphically documents the developing organisation of the redistribution system.

3. Large central buildings and indications of wealth document the emergence of a hierarchical order. Various new products—metal, ivory seals, faience—indicate craft specialisation, documented too by finds of specialised tool kits.
4. The nucleus of craft specialisation at village level, seen clearly at Myrtos, at Lerna and at Chalandriani, is already a palace economy in microcosm. There is little in the palace communities of second millennium Crete and Greece not already foreshadowed in the proto-urban settlements of the third millennium southern Aegean.

No attempt has been made to frame these observations as 'predictions' arising from the 'hypotheses'. Yet the model does have its prescriptive (and hence predictive) elements. It predicts that in areas of productive diversity (in terms of Mediterranean polyculture: olive and vine as well as cereals) and *only* in such areas will such a redistributive system emerge. It predicts a greater population growth rate in regions of the Aegean with true Mediterranean climate. And it predicts the development of craft specialisation in precisely those areas and not in others. These predictions are not contradicted by our

present knowledge of the third millennium Aegean, but the evidence available is not yet sufficient to try them effectively. Further work will test their validity.

Craft Specialisation /Wealth Model

The decisive factor is here viewed as the emergence of a stratified society, where high status correlates with material wealth and military prowess. These features arose largely as a consequence of the development of metallurgy and of maritime trade.

GENERAL STATEMENT

A prerequisite for any society with marked internal differentiation (hierarchy, craft specialisation etc.) is a subsistence system where the food produced will support more than those directly engaged in producing it. Many food-producing communities have a population level lower than full exploitation of their resources would permit. Moreover the per capita agricultural production could be increased, were this desirable to the producers, by the greater per capita investment of labour. An increase can arise when the agricultural producer, in exchange for his produce, can acquire attractive and desirable goods which will serve to enhance his status, and offer opportunity for the display of wealth. The craft specialist supported in this way supplies goods to an acquisitive society, where social status is closely and competitively linked to the display and consumption of wealth. Hostility and warfare are accompanying features.

ANALOGY

The concept of wealth expressed in goods other than food products is influential in nearly all societies developing beyond the level of a subsistence economy. The precondition for 'take-off' into sustained growth for an industrial society, as described by Rostow (cf. chapter 3) are precisely that production, including agricultural production, be stimulated by a demand for goods, stemming from a propensity to consume them. Although no prehistoric society was an industrial society in this sense, a clearly analogous process may be identified, where the demand for goods must be recognised as a significant factor favouring increase both in craft and subsistence production.

INITIAL CONDITIONS

By 3500 BC essentially self-sufficient villages throughout the Aegean coexisted in relative tranquillity. There is no evidence for high status or pronounced social hierarchy. *Spondylus* bracelets and stone axes are the only prestige objects known. Besides a local reciprocal transfer of such prestige objects, obsidian—a utilitarian material—was collected from the island of Melos and transferred on land on a basis of reciprocity. The smelting of copper was understood, although not intensively practised: the products were awls, pins and small objects, as well as thick flat axes, none of which carried a special prestige significance.

CAUSAL FACTORS

1. It is suggested that the alloying of copper with tin to form bronze allowed in the third millennium, for the first time, the production of a range of weapons able to bestow status and superiority in combat upon their owners. Metallurgical skills produced plate and jewellery of precious metal, incomparably finer as prestige objects than anything formerly available.
2. The geography of the Aegean is such that, given adequate shipping, maritime contact and the search for raw materials rapidly spreads any innovation of form or technique throughout the area. An effective enlargement of the cultural unit from the technological point of view (although not from the political) is the suggested consequence of any major technological discovery.
3. The demand for these new commodities favours specialisation in metallurgy and other crafts. The specialists would normally be supported within the original social framework, that is to say at village level. In consequence the status of the village chief, as controlling their production, would be increased, and expressed more conspicuously by fine metal goods and other objects.
4. The covetable nature of the craft products effectively established their position as wealth. Competition for their acquisition can be expected to lead to hostility and warfare, no longer disputing solely territories but also the ownership of goods.

AEGEAN DEVELOPMENT

1. An astonishing range of metal types is seen in the Aegean from the Early Bronze 2 period—weapons, tools, plate and adornments. The value to their owners is eloquently indicated by the dagger burials (of the Cyclades for instance) and the great hoards of metalwork at Troy.
2. The distribution of metal types (fig. 16.7) shows how widely and rapidly new forms were imitated. Pottery 'sauceboats', pottery *depas* cups and possibly marble folded-arm figurines, widely found in the Aegean (fig. 20.5) imitate metal types.
3. Smithies and other craft-production areas have been found at Chalandriani, Myrtos, Raphina and other sites. Their control by the chief is hypothetical, but an increasingly pronounced hierarchy of wealth is seen in the graves. Fine daggers (anticipating the ceremonial longsword of Mallia), and silver or gold diadems, express the status of the leader.
4. Stone fortifications are now widely seen (fig. 18.12) in areas where sudden attack from the sea was likely. In such areas there is evidence for a decline (or at least a retardation in growth) of population, and settlements were clearly sited with a view to effective defence.

This model again carries with it implications or associations which may be framed as predictions. For instance, regions rich in copper or tin ores should be outstandingly wealthy—a prediction not testable until a clearer picture is established of the original mineral resources available. The striking way in which the consequences of the model are seen in practice is documented in previous chapters. Indeed so effectively does it relate the features observed, which are already based upon substantial evidence, that further predictive tests are not obvious. Predictive power is not the sole criterion, however, for scientific validity: an explanation which simplifies the problem by relating its parameters is not to be dismissed merely as a logical exercise simply because many such relations are *already* documented. For they are not *finally* established: the generalisations and conclusions are always based upon the limited collections of data available at the time in question. They remain corrigible in the light of further research.

Both these models can be more effectively expressed in systems terms as outlined in chapters 2 and 3. There is no prior external variable in either. In the subsistence/redistribution model, the determining event was the domestication of the olive, a plant apparently locally available. In the craft specialisation/wealth model the initial event was the inception of effective bronze metallurgy. Both these initial advances are themselves to be explained within the context of the culture system. The strength of the systems approach is that neither has to be regarded as a prior event, a *fait accompli* initiating the causal chain. Bronze metallurgy undoubtedly came about because of growing interest in the production of the copper smith; there is a positive feedback relation between supply and demand, between production and the social impact of the product. The same may be true of the domestication of the olive: the olive may have been domesticated, and the vine too, because the juices expressed from the fruit (initially the wild fruit) contributed to the diversity of the subsistence system.

Both models are in large measure substantiated by the data at present available. The predictions of one do not contradict those of the other, although both claim to 'explain' the emergence of a social hierarchy. Yet the two are not simply different expressions of a single theory: they isolate different factors, and proceed to different (although not contradictory) conclusions. They are, to a large extent, complementary, and both could be entirely valid. In effect they are tracing different causal chains among the subsystems of a system where the linkages are exceedingly complex. Many more such models could be created, all equally valid, and all incorporating permutations and combinations of the interactions between the subsystems.

This proliferation of possible models is simply a consequence of the extreme complexity of the system whose growth we are seeking to explain. As indicated in chapter 2 any human society may be represented as a system: among so many interactions a whole series of feedback loops may be traced, all of them legitimately 'explaining' change in the society.

Such 'explanations' are limited, relating together only some elements of the system, and a 'total' explanation may hardly be possible. None the less a more general treatment can be undertaken in terms of the multiplier effect.

The Multiplier Effect in Action

The conditions favouring growth can be documented much more simply in terms of the multiplier effect, 'this mutual interaction in different fields of activity, this propensity of human systems that an innovation (and its adoption) in one subsystem favour innovation in another, this interdependence among subsystems which alone can sustain prolonged growth' as outlined in chapter 3. The interactions between the subsystems are of crucial importance. They may be expressed as a diagram (fig. 21.1).

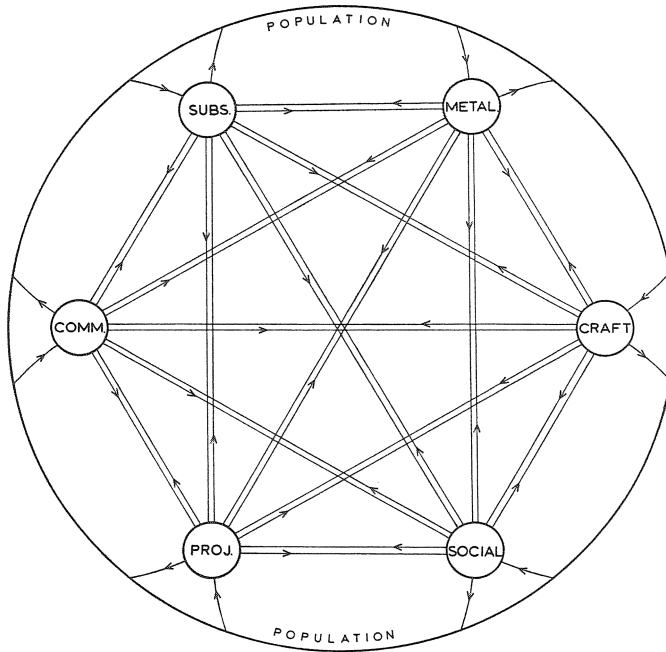


FIG. 21.1 Interactions between the subsystems of the culture system. Sustained positive feedback between them—the multiplier effect—results in culture growth and development (see also Ch. 2 and Table 21.1).

This does not in any way indicate relations between the culture and its environment, since aspects of both are included in each subsystem. It indicates rather the thirty different possible interactions among these subsystems ($A \rightarrow B$ and $B \rightarrow A$ are reckoned as separate interactions). Population, as discussed in chapter 2, is not in this sense a subsystem of society but a parameter, whose value is influenced by and influences each of the subsystems defined.

Culture, as we saw in chapter 2, is essentially a homeostatic device, a conservative influence ensuring that change in the system will be minimised. It is a flexible adaptive mechanism which allows the survival of society despite fluctuations in the natural environment. Culture consists, of course, of patterns of learnt activity. These are therefore

repetitive patterns: in similar circumstances a given action will normally be performed in the same way as on previous occasions. In each subsystem this determination of activity pattern by learning ensures that innovations are not readily accepted. By definition, what is new cannot have been learned through previous practice, and thus has no place in the existing cultural scheme of things. Wherever possible existing activity patterns will be adjusted to counteract the innovation.

Very few innovations within a functioning subsystem are accepted without strong opposition. The conservatism of non-industrial craft technology is well known: the village blacksmith is only gradually replaced by the engineering workshop. Forms of government, like forms of religion, are rigorously regulated by tradition and precedent. Even in contemporary societies this is a fundamental tenet of the law. Patterns of trade again show a long-term stability, especially when the trade implies social as well as commercial relations. And finally the subsistence basis of a society is not easily changed: pre-industrial man is nowhere more conservative than in his dietary tastes.

Strong social and religious sanctions proscribe most forms of innovation in a society: there is a negative feedback between the other subsystems and the social and the projective systems. Population too is homeostatically regulated in many societies, although the ultimate homeostatic controls of famine (when population taxes the possibilities of the subsistence system) and disease are not often brought into play. Social factors—birth control, abortion, prohibitions on sexual intercourse, even the disposal of unwanted babies—ensure that the population does not normally increase very rapidly.

This conservative nature of culture cannot too strongly be stressed. In terms of our model it is the natural tendency of culture to persist unchanged—apart from a small random drift which arises from the imperfect transmission of the cultural pattern between generations. It is change, any change, which demands explanation.

This complex of regulatory mechanisms operates so that even when change does occur in one subsystem, the effects upon the others are minimised. An innovation such as the smelting of copper may sometimes indeed be accepted in the craft technology subsystem as an alternative and shorter way of fulfilling an existing requirement, such as the manufacture of beads. On the other hand the production of new kinds of artefacts—new tools or weapons—would require new activities in a different subsystem to permit their use. Such new activities are not usually favoured.

The multiplier effect, where two subsystems enter into a *mutual* deviation amplifying relationship (mutual implies positive feedback), is needed to overcome this innate conservative homeostasis of culture. One or two examples from the early Aegean will illustrate this point.

The domestication of the vine in northern Greece during the fourth millennium BC may be regarded as an innovation solely within the subsistence subsystem. The vine was one of a wide spectrum of plants whose occasional use favoured gradual domestication and improvement, and whose gradual domestication favoured more frequent use. This is positive feedback within the subsystem. In a conservative society the dramatic intoxicating properties of new alcoholic drinks might at first seem socially and

religiously undesirable, just as does the use of new stimulants in our own day, although they are prevalent without ill effects in other societies.

When the subsistence innovation is answered by an innovation in another subsystem, the situation is transformed. If the festive potential of wine leads to the institution of social drinking, as the gold and silver drinking vessels of the Aegean third millennium suggest, wine production is favoured. The increase in wine production leads to increased skill in manufacture and greater control over the product, which is thus improved, further favouring its wider adoption. Alternatively the intoxicated ecstasy produced may be recognised as of positive religious benefit; another positive feedback loop between systems is established. In both cases the multiplier effect comes into operation: there is a non-reversible growth both of the social (or religious) subsystem and in range and bulk of production in the subsistence subsystem. The society has grown a little, not merely in size but in complexity.

A small increase in the bulk of objects handled by the trading system, to take another example, may be of little apparent significance. Yet if it is coincidental with a development in craft technology the consequences can be dramatic. The production of the dagger in the third millennium BC gave the trader a new commodity. It coincided too with another development in craft technology, the creation of the longship. These both favoured an increase in trade (as did the need for raw copper). The increase in trade led to increased metallurgical production, to the discovery of new techniques resulting from increased specialisation, and to the acquisition of new ideas and techniques from overseas. Trade and metallurgy grew together as neither could have done without the other.

It is interactions of this kind which make possible the sustained growth and development of new processes within society. The positive coupling of the subsystems overcomes the homeostatic controls which would otherwise stifle new development. Such interactions thus lie at the root of all growth and development within the culture.

The field of possible interactions, in terms of the subsystems which we have defined, as seen in fig. 21.1, is given by the matrix in Table 21.1.

TABLE 21.1 Matrix of interactions between the subsystems of the culture system (and with population).

<i>y</i> \ <i>x</i>	<i>Subs.</i>	<i>Met.</i>	<i>Cr.</i>	<i>Soc.</i>	<i>Proj.</i>	<i>Yr.</i>	<i>Pop.</i>
<i>Subs.</i>	–	B1	B5	B2, B3, B4	B7	B6	B8
<i>Met.</i>		–	C1	C2, C3, C4		C5	
<i>Cr.</i>	D1	D4	–	D2	D5	D6	D3
<i>Soc.</i>	E1	E2, E3, E4	E2, E3	–	E5		E6
<i>Proj.</i>			F1, F5	F2, F3	–	F4	F6
<i>Tr.</i>	G1	G2, G3	G4, G5	G6	G7	–	
<i>Pop.</i>	A1		A4	A2, A5	A3		–

Note: Growth in subsystem *y* favoured by growth in subsystem *x* through the mechanism indicated in the matrix (cf. list below). The subsystems listed are: subsistence, metallurgy, craft technology, social systems, projective and symbolic systems, trade and communication. Population is also included.

These are the possible interactions which can permit the operation of the multiplier effect, and initiate sustained growth. The growth of any culture or civilisation may be considered and explained in these terms. The figures within the matrix refer to the specific case in question, the prehistoric Aegean, and are discussed below.

Factors and Interactions in the Third Millennium Aegean

The emergence of Aegean civilisation has to be explained in terms of the positive interactions between the various subsystems which can be detected during the third millennium. The following summary lists such principal changes in each subsystem during the third millennium as have emerged from the discussion in previous chapters. Changes occurring in other subsystems which may have favoured these are indicated: they are noted in the appropriate space in Table 21.1. The list begins with population and settlement, which although not constituting a subsystem of the culture system, are important features of it.

A. POPULATION AND SETTLEMENT

- (a) Population, as estimated on the basis of the number of settlements found, and their size, was increasing throughout the Aegean during the prehistoric period.
- (b) The growth rate was slow in north Greece, and much more rapid in the south.
- (c) In the two southern areas, which of those surveyed had extensive arable land (Crete and Messenia), the rate of increase from neolithic to late bronze age seems to have been approximately exponential.
- (d) In the other southern areas surveyed, the initial increase was of the same order, but growth was markedly retarded at the time of the middle bronze age.
- (e) The size of neolithic village settlements in the Aegean was comparable with that of the smaller Near Eastern settlements. The increase in area from neolithic to early bronze age proto-urban settlement, and from early bronze age to late bronze age settlement was in each case by a factor of about 2. This is much less than in the Near East, where the growth was by a factor of about 10.
- (f) In neolithic times the settlements were generally not fortified. During the third millennium fortifications of stone are seen in eastern mainland Greece, the Cyclades and western Anatolia. By the late bronze age they are widely found throughout the southern Aegean, with the exception of Crete.
- (g) During the third millennium in certain maritime areas, notably the Cyclades, the number of settlements becomes smaller and the important sites larger in size. They are often located at some distance from the sea, in good defensive positions.
- (h) A hierarchy of settlements, in terms of size, may be recognised in the later bronze age of Crete, and in certain other regions of the southern Aegean.

- (i) Specialisation and differentiation of function within the settlements is documented by workshops and by large central buildings, first seen at this time.

FACTORS FAVOURING POPULATION INCREASE

- A1. Increased efficiency in food production, and increased diversity in crops grown.
- A2. Effective redistribution of foodstuffs within the social unit.
- A3. Possible new social and religious beliefs reducing homeostatic control of population level (hypothetical).
- A4. Improved medical knowledge, a special aspect of craft technology (hypothetical).
- A5. Military security favoured by hierarchical organisation and practical defensive measures.

B. SUBSISTENCE

- (a) The later neolithic subsistence economy is marked by greater diversity in the range of crops, and greater specialisation, in that much purer crops were produced.
- (b) These tendencies continued into the early bronze age, when barley was more important than previously, and pulse crops played a major role.
- (c) Tree crops, notably the olive and the vine, were now domesticated. The fig was already exploited in the later neolithic.
- (d) Industrial products (olive oil and wine) were produced from the third millennium, and stored effectively in large containers.
- (e) These and other commodities were handled by the redistribution system which emerged in the third millennium to form the basis of the later palace economies.
- (f) The diet was supplemented, but only to a limited extent, by the usual neolithic range of domestic animals, and by fish.

FACTORS FAVOURING DEVELOPMENT IN THE SUBSISTENCE SUBSYSTEM

- B1. New metal tools increasing agricultural efficiency.
- B2. Stimulus on production of the redistribution system, both by the wish to receive redistributed goods, and by sanctions applied if quotas were not met.
- B3. Social factors, including the use of prestigious drinking vessels, augmenting the demand for wine.
- B4. The use of oil lamps augmenting the demand for olive oil (minor factor).
- B5. The desire to acquire new craft products in exchange.
- B6. The development of overseas trade favouring production increase.
- B7. The requirements of subsistence commodities for religious offerings stimulating production (minor factor).
- B8. Pressure for increased food production brought about by population increase.

C. METALLURGY

- (a) Metallurgical output increased dramatically in the early bronze age, and especially in the Early Bronze 2 period. It followed the limited production of copper and of gold in the final neolithic.

- (b) The metallurgical skills emerging during the third millennium included:
 - i. Alloying of gold with tin or with arsenic to yield bronze.
 - ii. Smelting and casting of lead.
 - iii. Hammering of gold and silver to produce attractive decorative shapes.
 - iv. Raising of sheet metal to produce metal vessels.
 - v. Use of rivets.
 - vi. Production of wire.
 - vii. Ornamentation by granulation.
- (c) The dagger and spear of bronze both made their appearance. The dagger evolved during the early bronze age to yield the sword.
- (d) Useful metal tools, including large flat axes and shaft-hole axes were produced.
- (e) A whole series of smaller craft tools, including awls, borers and gouges was produced.
- (f) Jewellery and articles of adornment in gold, silver and bronze were now made.

FACTORS FAVOURING GROWTH OF METALLURGY SUBSYSTEM

- C1. Developments in the field of craft technology, notably pyrotechnological discoveries of the potter.
- C2. The need for weapons arising through the increase in military hostilities.
- C3. The desire for objects of display.
- C4. The custom of burying valuable metal objects with the dead, which removed them from circulation.
- C5. Effective supply of raw materials now available from overseas through trade.

D. CRAFT TECHNOLOGY

- (a) Craft specialisation is implied by some of the products of the time—engraved seals, for instance, or faience—and direct evidence, although rare, yielded by finds from several sites.
- (b) A new range of tools furthered the traditional crafts like carpentry and masonry.
- (c) Several crafts, like those of the shipwright and of textile production, were transformed through the creation of new products, through specialisation, and by the availability of new tools.
- (d) A number of entirely new crafts—the skill of the lapidary, of the faience producer, of the jeweller—came into being.
- (e) The outcome of these advances in craft technology was a whole new range of craft products, best exemplified in the first palaces with their well-dressed masonry, their rich furnishings, and later their fresco decoration.

FACTORS FAVOURING GROWTH OF CRAFT SUBSYSTEM

- D1. Craft specialisation, made possible by increased agricultural production.
- D2. Concentration of resources by redistribution, supporting craft specialisation at the redistribution centre.

- D3. Increased population, passing the population threshold for craft specialisation in the village unit.
- D4. New metal tools making possible an entire range of new crafts (the stonemason, the sculptor, the shipbuilder, etc.).
- D5. Religious representation and the sumptuous decoration of living spaces in the palaces requiring craft specialisation.
- D6. The trade in oil, perfume, textiles, etc., favouring specialist craft production.

E. SOCIAL SYSTEMS

- (a) Objects of value, doubtless implying considerable prestige, are clearly recognisable for the first time in the third millennium. Often they are of metal—weapons of bronze and plate of gold and silver. This is the first clear expression of wealth in the archaeological record.
- (b) A growing disparity between rich and poor is documented by grave goods from the third millennium onwards.
- (c) Objects of symbolic importance—diadems and weapons of display—indicate the emergence of a hierarchy in social as well as economic terms. This is supported by the large central buildings at several proto-urban sites.
- (d) A developing notion of property is indicated by the seals and sealings in the third millennium.
- (e) The redistribution system developed, anticipating that of the first palaces, in both Crete and southern Greece.
- (f) Organised warfare, with specialised weapons of offence and stone fortifications for defence, now developed.
- (g) With war came the emergence of warriors, well documented by graves containing several weapons and heralding those of the late bronze age.
- (h) Several of these developments make the notion of the rise of chiefdoms at this time an appropriate one.

FACTORS FAVOURING THE DEVELOPMENT OF THE SOCIAL SUBSYSTEM

- E1. Diversity in subsistence production leading to a redistribution system.
- E2. New forms of visible and prestigious wealth (the product of metallurgical and other craft production) encouraging the emergence of hierarchical distinctions.
- E3. Visible wealth provoking competition and war.
- E4. New weapons facilitating war and the emergence of the warrior class.
- E5. Writing, aiding redistributive administration.
- E6. Increase in population favouring social definition by roles (e.g. craft profession) rather than by kinship.

F. PROJECTIVE SYSTEMS

- (a) Concepts of measurement, both of weight and number, were clearly formulated. Standards of measure may already have been set up.
- (b) Symbolic expression of meaning (on seals) already anticipated the development of hieroglyphic writing in the second millennium.
- (c) The representation of forms from the world of nature, in painting and sculpture, first animals and then plants, became more accomplished.
- (d) A more complex religious symbolism emerged.
- (e) Burial of the dead in built graves, either singly or collectively, became widespread. The dead were accompanied by grave goods.
- (f) Several musical instruments were now available, for both song and dance.
- (g) A whole new range of decorative techniques was developed, and coherent styles may be distinguished.
- (h) New rituals and games are documented at this time.

FACTORS FAVOURING DEVELOPMENT OF PROJECTIVE SUBSYSTEMS

- F1. Craft specialisation necessitating exchange and hence the formulation of concepts of equivalence, of weights and measures.
- F2. The developing social system favouring new forms of symbolic expression.
- F3. The changing social order encouraging corresponding changes in the religious order.
- F4. Contact with other lands leading to innovations in artistic expression and religious symbolism.
- F5. Improved craft technology offering new means of expression, both in art and in music.
- F6. The increasing population promoting new forms of play and ritual, e.g. the bull sport.

G. TRADE AND COMMUNICATION

- (a) Reciprocity was gradually replaced by redistribution during the third millennium as the principal mechanism for the transfer of goods within the social unit.
- (b) Reciprocity, doubtless through gift exchange, remained an important mechanism for the transfer of goods between territories.
- (c) The directional or commercial trade of the later bronze age is heralded, at least in Crete, by the freelance trade which may account for finds of ivory and other materials imported from the Near East and Egypt.
- (d) Contacts between the Aegean and other Mediterranean areas were few during the third millennium, although communication between Crete and Egypt was established by the end of the final neolithic.

- (e) Contacts within the Aegean became especially numerous during the Early Bronze 2 period, so that one may speak of an international spirit at this time.
- (f) The objects most widely distributed in the Aegean were metal weapons, tools and vessels. Pottery forms imitating those of metal are widely found.
- (g) Transport in the Aegean was always principally by sea, although carts are documented from Crete.

FACTORS FAVOURING THE GROWTH OF THE TRADE AND COMMUNICATION SUBSYSTEMS

- G1. The increased diversity in subsistence products.
- G2. The wide range of new and desirable products of metal.
- G3. The pressing need for raw materials, especially metal.
- G4. The emergence of new craft products, especially textiles and olive oil.
- G5. Improved ships.
- G6. The wealth and high status of chiefs, promoting the exchange of luxury goods.
- G7. New forms of expression permitting new modes of communication by artistic and symbolic means.

The developments set out in this list are changes in the culture system, documented or at least suggested by the archaeological record. With them are listed changes elsewhere, in other subsystems, tending to favour the developments taking place.

A number of these contributory factors constitute, together with the change they favour, simple positive feedback loops. For example the production of new commodities, such as metal objects or perfumed oil, tended to increase trade, while increased trade stimulated increased and more efficient craft production. At first sight such statements seem almost tautologous: demand favours production, and production promotes demand. On the contrary, however, they are highly meaningful—increased production does not necessarily promote demand: the converse is often true—and their apparent simplicity should not mask their decisive influence upon growth. In chapter 3 two analogous views to these were contrasted: food production efficiency determines population density (Malthus), and population density determines food production efficiency (Boserup). We saw that when increased food production efficiency favours population growth, and increasing population favours food production efficiency, the positive feedback sets up a sustained growth cycle for just as long as the two propositions remain true. These simple feedback loops are the very basis for culture growth.

These positive interactions are indicated in the matrix, Table 21.1, and the pattern of their interactions as well as their persistence during change in other aspects of the society, and their strength, determine the growth of the culture. The multiplier effect, the positive interaction between subsystems which comes into play allowing sustained growth, may be said to have brought about the emergence of Aegean civilisation, just as it brought about that of other civilisations. The precise way in which it operates, and the nature of the resultant society which the process creates, are determined by the specific

nature of the matrix of interactions. They are themselves, of course, governed both by the natural environment and the initial conditions of the culture whose changes are being studied.

Here, then, is a general model for the growth of culture, sufficiently adaptable to accommodate any initial conditions, whether environmental or social. The matrix of interactions determines the nature and the speed of growth.

Two serious limitations are at once apparent. In the first place, the explanation for growth is descriptive, qualitative, and does not make predictions in precise quantitative terms. This is a regrettable but not insuperable difficulty: economists and geographers increasingly formulate quantitative predictions, and sociologists no doubt will soon follow. A much more serious objection is that we have at present no effective criterion for judging whether or not the postulated interaction is significant at all. A whole range of mechanisms could be postulated to relate any pair of subsystems in a whole variety of different ways. Were this objection to be sustained, the whole explanatory model offered here would indeed be a logical abstraction without any possible practical application.

This apparent weakness is, however, shared by nearly every historical or processual explanation. In outlining a causal chain for the development of a culture or a society, some of the links or steps in the chain inevitably involve human beings, and interaction between them and their environment. Regularities in response are dependent upon regularities in human behaviour. Ultimately an explanation which fails to recognise this will have limitations as serious as an explanation for the behaviour of chemical compounds which refuses to consider the behaviour of the constituent molecules. The multiplier effect model, far from avoiding this difficulty, inherent in any historical or processual explanation, highlights the significance of these human interactions which are at the root of all culture change.

Ultimately the evaluation of the causal links between events raises real philosophical questions. The prehistorian or historian is faced with Russell's paradox of the Two Factory Hooters, sounding simultaneously in two remote cities, A and B, so that workers at A might be said by an external observer to stop work *because* of the hooter at B. When a given consequence in the past *seems* regularly to flow from a specific cause, can we really establish a causal relationship? Indeed we are in greater perplexity, since it is difficult even to establish the true constant conjunction of events in the past. The philosopher's solution is to establish a spatio-temporally continuous chain of events between the occurrences at A and B, 'an intermediate chain of events, some of which are outside the body, some of which are in the ear, some of which are in the auditory nerve, some of which are in the brain' (Braithwaite 1953, 308). When dealing with the growth of human societies, the varieties of human behaviour are an inevitable, if inconvenient, component implicit in all explanations.

That interactions between subsystems, and interactions of economic, social and spiritual forces operating upon the human individual, are given prominence is thus

not necessarily a weakness in the multiplier effect model. These are fields which the archaeologist understandably avoids, since his evidence relating to them is often so inadequate. Yet while the behaviour of the group, of many individual units, may often effectively be described in statistical terms without reference to the single unit, it cannot so easily be *explained* in this way. This is a problem which prehistoric archaeology has yet to resolve: nothing is to be gained by avoiding it.

The Human Basis for the Multiplier Effect: Interactions among Human Activities

The crucial interactions between the various fields of human activity (the subsystems of the culture system) whose effective operation has been termed the multiplier effect, have been identified as indispensable to sustained growth. Their precise nature and origin must now be considered.

The interactions among the subsystems of the society take place chiefly at the level of the human individual, since the subsystems of a culture are defined ultimately by the activities of individuals. It is the individual who equates wealth with prestige or social rank, for instance, or who forms for himself a projection of the world where social roles and religious concepts both find a place. Here certain essential differences between human and animal behaviour, differences fundamental to the growth of human culture, deserve more comment than they have received from archaeologists.

Recent studies in animal behaviour have indeed revealed a whole range of activities analogous to those which, in humans, are felt to respond to secondary or derived needs rather than to the primary needs of animal existence. Their adaptive significance, like that of many human activities, is not always obvious. A striking instance is display, sometimes competitive display, among members of the same species. Another is the social hierarchy or 'pecking order' established among some social groups of animals. These and other instances of social behaviour, such as territoriality, narrow the gulf which was formerly thought to separate human and animal behaviour. But in other fields this gulf remains a very real one.

The social activities of man are not always expressed in purely social terms. Social hierarchy can indeed be established by personal combat—a purely social form of contact—but more commonly among humans it is determined in other ways. Social actions are effected more often in material terms—by display of material wealth, for instance, or by gifts of valued objects. Out of this equation of material objects and social activities or values, which in cold logic are simply not equivalent, existing as they do in different dimensions, arises the whole complex pattern of interactions among human activities such as those which we have been describing. Such links among the activities in different dimensions of the human individual make possible the links between the subsystems of the culture system which allow the operation of the multiplier effect.

The essential kernel of many of the interactions between activities and between sub-systems, interactions which are the mainspring for economic growth, develops from the human inclination to give a social and symbolic significance to material goods. For in this way a whole complex of activities in the material world satisfies aspirations, ambitions and needs which are, at first sight, entirely without adaptive significance in facilitating the continued existence of the individual or the species.

Both the consumption of goods and their storage to ensure later availability are functional activities, in the adaptive sense: they are life preserving. Yet as Veblen (1925) so well expressed, 'It is only when taken in a sense far removed from its naïve meaning that consumption of goods can be said to afford the incentive from which accumulation invariably proceeds. The motive that lies at the root of ownership is emulation; and the same motive of emulation continues active in the further development of the institution to which it has given rise and in the development of all those features of the social structure which this institution of ownership touches. The possession of wealth confers honour; it is an invidious distinction. Nothing equally cogent can be said for the consumption of goods, nor for any other conceivable incentive to acquisition, and especially not for any incentive to the accumulation of wealth.' Keynes made the same distinction in writing of the needs of human beings which 'fall into two classes—those needs which are absolute in the sense that we feel them whatever the situation of our fellow human beings may be, and those which are relative only in that their satisfaction lifts us above, makes us feel superior to our fellows' (quoted by Galbraith 1969, 145).

This pecuniary emulation is one of the fundamental objectives of the Acquisitive Society, or the Affluent Society. We have seen in chapter 18 that prestigious goods were evidently valued in the third millennium Aegean, and while their distribution may have been governed largely by existing conventions, their increasing importance cannot be so explained. Factors may already have been operating of a kind which we recognise today: 'Property now becomes the most easily recognised evidence of a reputable degree of success as distinguished from heroic or signal achievement. It therefore becomes the conventional basis of esteem.... The possession of wealth, which was at the outset valued simply as an evidence of efficiency, becomes, in popular apprehension, itself a meritorious act. Wealth is now itself intrinsically honourable as it confers honour on its possessor. By a further refinement, wealth acquired passively by transmission from ancestors or other antecedents presently becomes even more honorific than wealth acquired by the possessor's own effort' (Veblen 1925, 28–29). In the third millennium Aegean wealth and status were undoubtedly closely related to kinship, as doubtless in neolithic times. Yet the development of new classes of goods, offering new and tempting scope for the acquisition of wealth, was instrumental in the transformation of a self-sufficient peasantry in Aegean society to the acquisitive proto-urban and later urban citizens of civilisation.

Wealth itself became desirable, and pecuniary emulation was the underlying motive for many activities. Another was display, and the conspicuous consumption of

this wealth. 'Throughout the entire evolution of conspicuous expenditure, whether of goods or of services or human life, runs the obvious implication that in order to effectually mend the consumer's good fame it must be an expenditure of superfluities. In order to be reputable it must be wasteful. No merit would accrue from the consumption of the bare necessities of life, except by comparison with the abjectly poor who fall short even of the subsistence minimum; and no standard of expenditure could result from such a comparison, except the most prosaic and unattractive level of decency' (ibid., 296–97). The finery of the Minoan palace, the treasures of the Mycenaean Shaft Graves, the golden drinking cups of Troy, were not conceived solely for the material well-being of those who enjoyed them. They were produced also to signify the wealth of the owner, and to reinforce that impression by extravagance as well as by opulence. Since the owner was the leader, this acted to reinforce his authority and prestige, and hence the effectiveness of his leadership. This conspicuous consumption of wealth is a feature of many agricultural societies, from the potlatch and the gift exchange of barbarism to the wedding or funeral of Western civilisation. The scope for such display and consumption was greatly increased by the creation of new classes of valuable goods—metal objects, for instance, sealstones, wine, perfumed oil perhaps, cosmetics—in the third millennium Aegean, and indeed in the formative stages of many civilisations.

Underlying these expressions of social status, these mechanisms for enhancing reputation and self-satisfaction, is a *symbolic equivalence of social and material values*, an equivalence without which the multiplier effect could scarcely operate. The well-being which comes from the satisfaction of primary animal needs is no longer the chief human goal, but rather the satisfaction accruing from prestige, status and good reputation. These too can sometimes be acquired and expressed through material goods. The material world is now the field for a symbolic competition. During the third millennium Aegean this symbolic equivalence seems to have become far clearer, and the demand for commodities—a demand which is necessary for the promotion of any new production and hence of any growth in the culture—much more pressing. This symbolic equivalence of social and material values became clearer, too, and somehow more explicit through the formulation of a different kind of equivalence, the equivalence of different kinds of commodities. There is nothing to say that so much, by weight, of flour for instance is the equivalent of a given quantity of copper, and reciprocal exchange, the 'total prestation' (Mauss 1954) of gift exchange with its complex social overtones, avoids this considerable conceptual advance. So too, to some extent, does redistributive transfer, and only markets with explicit exchange rates, and ultimately a money economy make the symbolic equivalence explicit, total and fixed. Yet the redistributive system of the Minoan-Mycenaean palaces, with its quotas and its ration allowances, allowed the equivalence to work in practice.

Both these equivalences are symbolic—they are constructs of the human mind, in the manner so lucidly described by Cassirer (cf. chapter 19). Their adaptive value is enormous, for they alone make possible the interactions between the various activities

of a society. In a sense these symbolic equivalences are the means of communication between the subsystems of a culture, which otherwise would function independently.

Alongside these abstract yet fundamental foundations of civilisation—pecuniary emulation, conspicuous consumption, and the symbolic equivalence of commodities—is a fourth, which ensures that a culture continues to grow even when any reasonable absolute demands of its citizens have been met. This is what economists term ‘income elasticity of demand’—as the saying goes, ‘the more you have, the more you want’. The average citizen in a Western society today has a standard of living and a range of material possessions not merely higher than those of his ancestors of three centuries ago, but higher than any to which his seventeenth-century ancestors could have aspired. Yet he does not feel he has enough, that he can sit back and enjoy these material comforts. ‘The urgency of wants does not diminish appreciably as more of them are satisfied.... When man has satisfied his physical needs then psychologically grounded desires take over. These can never be satisfied, or in any case no progress can be proved. The concept of satiation has very little standing in economics’ (Galbraith 1969, 138).

Once again it was Thorstein Veblen who most clearly expressed an essential principle of wide although not universal validity, that whatever the normal average standards of society, this standard will still seem inadequate and insufficient to those who have attained it.

‘As fast as a person makes new acquisitions, and becomes accustomed to the resulting new standards of wealth, the new standard forthwith ceases to afford appreciably greater satisfaction than the earlier standard did. The tendency in any case is constantly to make the present pecuniary standard point of departure for a fresh increase of wealth: and this in turn gives rise to a new standard of sufficiency and a new pecuniary classification of one’s self as compared with one’s neighbours.... However widely, or equally, or ‘fairly’, it may be distributed, no general increase to the community’s wealth can make any approach to satiating this need (for wealth), the ground of which is the desire of everyone to excel everyone else in the accumulation of goods. If, as is sometimes assumed, the incentive to accumulation were the want of subsistence or of physical comfort, then the aggregate economic wants of a community might conceivably be satisfied at some point in the advance of industrial efficiency; but since the struggle is substantially a race for reputability on the basis of an invidious comparison, no approach to a definitive attainment is possible.... The strain is not lightened as industrial efficiency increases and makes a lighter strain possible, but the increment of output is turned to use to meet this want, which is indefinitely expansible, after the manner commonly imputed in economic theory to higher or spiritual wants. It is owing chiefly to the presence of this element in the standard of living that J. S. Mill was able to say that “Hitherto it is questionable if all the mechanical inventions yet made have lightened the day’s toil of any human being” (1925, 31–32, 111).

Here is one of the ultimate and hidden sources of change and progress in society, an unremitting influence favouring sustained and increasing growth in human culture. Of course social emulation and the conspicuous consumption of wealth are not the

only aspects of behaviour which lead to this crucial, symbolic equivalence of social and material values. Other societies have different sets of personal values, other goals and motivations, and those discussed here perhaps seem to us appropriate precisely because they are very much those of our own acquisitive, consumer society. The desire for status or prestige may be a common feature of most societies, but in many it is rather modesty, and parsimony in the acquisition or consumption of material goods which are likely to enhance them. Yet it does seem that, for the multiplier effect to operate, the 'currencies' in the different systems of society must come into some kind of equivalence in this way. Aegean civilisation came about, as doubtless did most early civilisations, as the social and material equivalences just described were established. It was these equivalences which enabled the activities of one subsystem to be relevant to those of other subsystems. Interactions were established which permitted, in a variety of ways, the operation of the multiplier effect. The related developments and innovations in the coupled subsystems, in the several yet now related fields of action, were able to overcome the conservative and homeostatic effects of culture and to sustain a growth not simply in size or scale but in diversity and complexity. The working of the multiplier effect is dependent entirely upon the development of such interaction between the subsystems of a culture, and these interactions become possible only through the formulation of symbolic equations like those mentioned. Population increase, another supposed prime mover for culture growth, does not so readily bring about changes of structure: civilisation is not merely the product of population increase. Civilisation comes about through social change coupled with material advance: neither can long be sustained without the other.

The Emergence of Civilisation

These abstractions take us right outside the field of archaeology, and into the realms of psychology and of sociology. But this is as it should be. In seeking first to describe and then to understand the emergence of the first Aegean civilisation we are studying a process clearly analogous to processes which have occurred elsewhere and at other times. And the study of culture process, while not necessarily resulting in the formulation of laws, must reveal comprehensible patterns which allow some kind of generalisation about human events and activities. Human societies, even prehistoric societies, cannot profitably be discussed in terms of artefacts alone.

Indeed while this discussion has proceeded, on a detailed level, in terms of the data available from the third millennium Aegean, the model utilised is potentially of far wider application. For any civilisation the growth underlying its emergence may be analysed in terms of the multiplier effect, a model allowing the simultaneous consideration of social and religious systems in society as well as the material ones of subsistence and craft technology.

Human adaptation to the natural environment is not simply, or even primarily, the solution of subsistence problems or the successful utilisation of the material resources

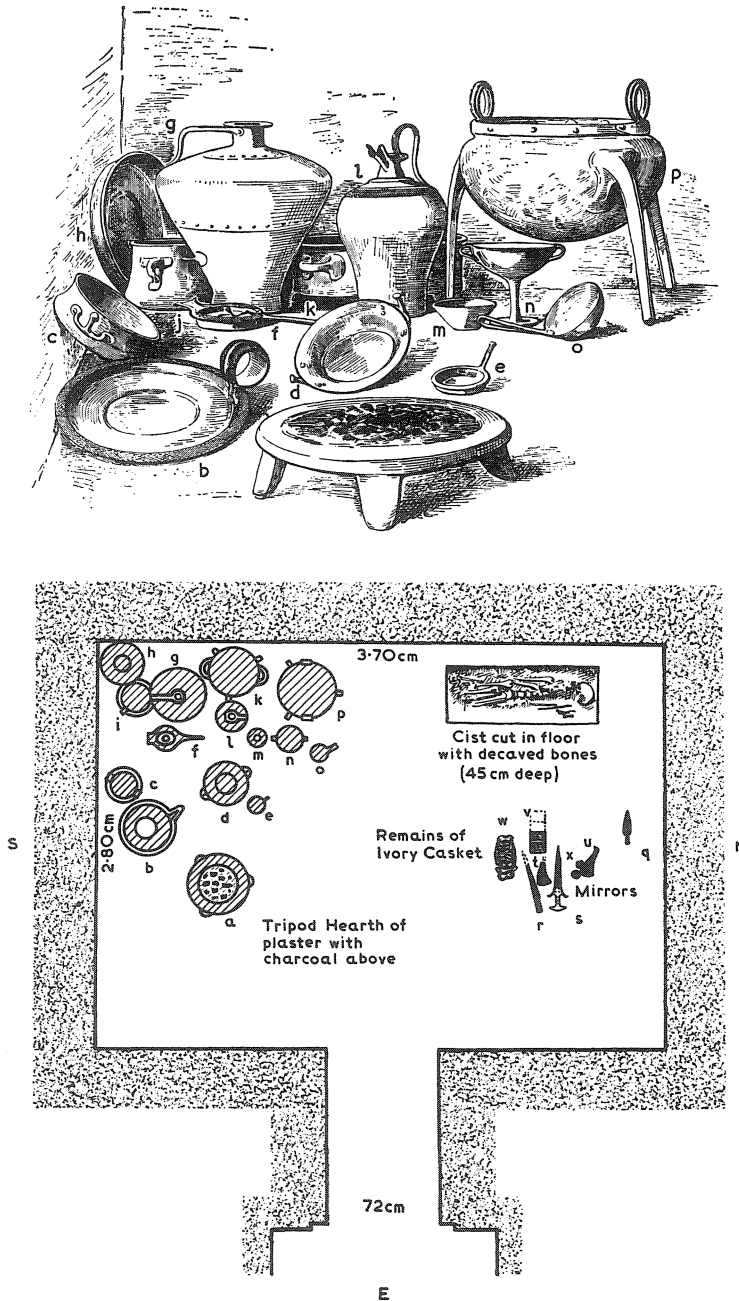


FIG. 21.2 Key factors of Minoan-Mycenaean civilisation, as epitomised by the Late Minoan Tomb of the Tripod Hearth at the Zapher Papoura cemetery: the Symposium. The elaborate equipment in metal for the service of wine is the product of interconnected social, religious, technological and subsistence factors. Note the oil lamp (f) (*after Evans*).

of micro-environments, although some archaeological analyses may make it seem so. These are problems which man shares with all animal species. In human societies the new and challenging problems are those which involve coming to terms with other human beings, and ultimately indeed with oneself. These specifically human problems are an essential component of human adaptation.

The Minoan-Mycenaean civilisation found one solution to these problems, a solution taking shape in the third millennium BC under the influence both of the Aegean environment and of the accumulated experience from the neolithic past. Some of its salient features are epitomised in the grave goods of a burial in the Late Minoan cemetery at Zapher Papoura near Knossos (fig. 21.2): the aristocratic finds express a developed social and religious order, while the excellence in the workmanship of the bronze wine service reflects the developments in Minoan subsistence and technology. Implicit, too, in their creation and use is the Minoan palace, the supreme expression of the social and technological environment created in the Aegean late bronze age. The Minoans and Mycenaeans created a system which allowed them or at least their leaders, to live in a complex and artificial environment. Its major elements, material, social and spiritual, were constructs, human creations, as sophisticated as in other earlier civilisations.

The intense localisation of this civilisation, its concentration at the palace nuclei made it, however, very vulnerable to change. The culture system was in equilibrium, and remained in equilibrium for 400 years, but its very specialised form limited the potential range of its homeostatic controls. Without the palaces the civilisation would no longer exist. And so it came about. Whether through sickness, social unrest or attack from outside the system, that system broke down during the twelfth century BC. The palaces were abandoned, the redistribution organisation collapsed, military security disappeared and the wide range of luxuries produced by the specialist palace craftsmen were no longer seen. The collapse of the redistribution system and the disappearance of personal security further contributed, by a destructive positive feedback process, a vicious circle, to the population decline which may initially have triggered them off. Minoan-Mycenean civilisation came to an abrupt end by a process just as intelligible in systems terms as the constructive process which led to its emergence a millennium earlier.

The multiplier effect permits, as we have seen, an analysis of the origins of this culture system, just as it would no doubt offer an insight into the operation of the new subsystems working together five hundred years later to form the classical Greek civilisation. Many of the components of the Minoan-Mycenaean subsystems participated in this—but that is another story.

These are both specific instances of a more general pattern of growth which may be discerned in the formation of most, perhaps all urban societies and civilisations. All of them required a subsistence production improved beyond that of their neolithic farming predecessors. Each had its own social organisation and religious beliefs, embodied in complex institutions and expressed with some magnificence and monumentality.

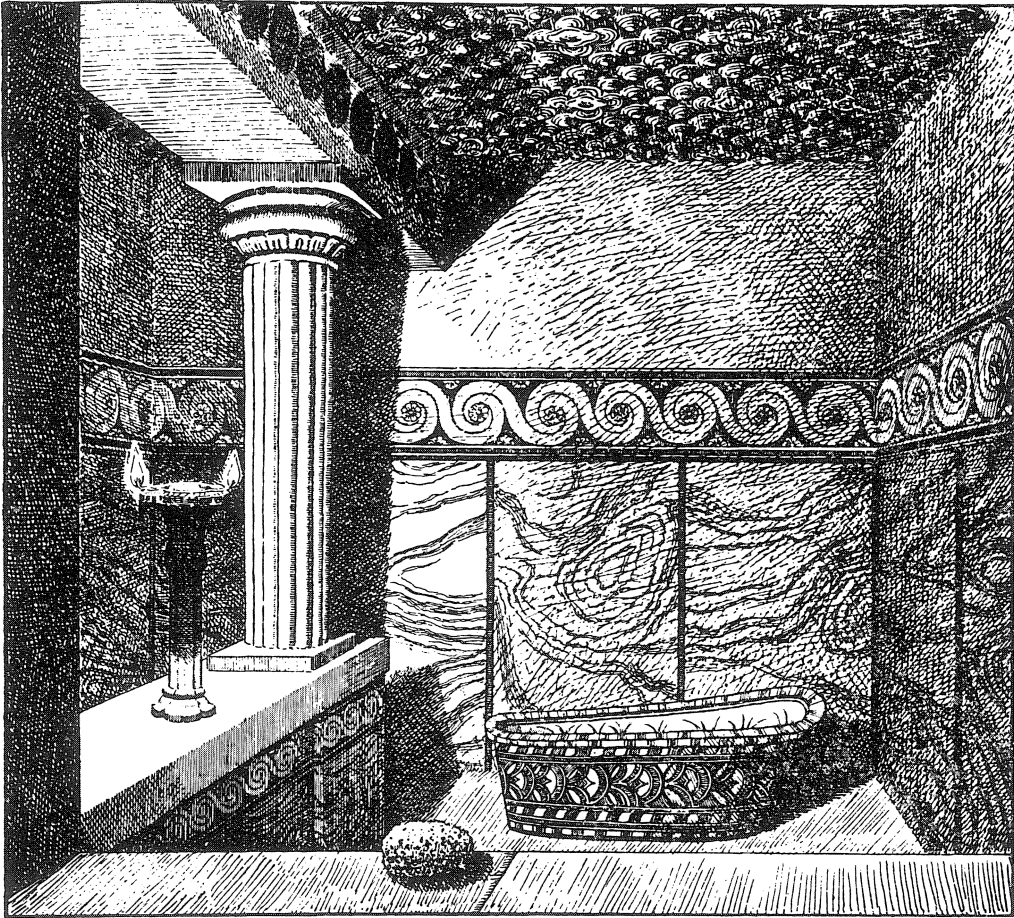


FIG. 21.3 Civilisation as man's created environment: artist's view of a Late Minoan II bathroom at the palace at Knossos (by Piet de Jong; after Evans).

Technology in each case developed alongside of craft specialisation, with trade and redistribution their natural counterparts.

Yet no single one of these developments could alone bring about urbanisation or civilisation. The 'temples' of neolithic Malta, for instance, might well be imagined as an integral component of one of the world's great early civilisations. Yet instead they stand alone, the testament of a society whose subsistence and craft technology could not keep pace with its religious and social organisation.

Only when innovation in one of these subsystems could favour development in others, by the process here termed the multiplier effect, would sustained growth take place. Such interactions at the macro-level simply describe in aggregate the interaction at the

level of the human individual, the atomic or micro-level. For when social changes, for instance, favour economic growth (the social subsystem interacting with the subsistence and craft technology subsystems) individual human beings are making economic decisions for social reasons. Human individuals can and do equate social and material values, and this symbolic equivalence, when widely accepted among the population, sets the multiplier effect in operation.

In prehistoric times this equivalence found expression in relatively simple, undifferentiated institutions like the redistributive palace system of the Minoans and Mycenaeans. In its symbolic aspect this redistributive system may be regarded as a means of communication, bringing into effective and productive contact all the different members of the palace organisation and the entire population of the palace territory. Subsequently the invention of monetary currency, and later of banking and the limited company fulfilled analogous although more specialised functions, allowing different elements in society to be brought into more fruitful and productive cooperation. These innovations are indeed similar in kind. Like the invention of electronic communication and computerised data handling in our own day, they bring more people, and more widely differing occupations effectively together, offering a structure to relate increasingly specialised occupations in totally different fields of activity.

Prehistoric archaeology cannot effectively explain significant changes in human culture without considering in this way the social and projective systems of that culture as well as its purely material ones. Sustained growth, long-term change in human culture, comes about neither through social progress alone nor by independent technological innovation but from the uniquely human ability to find symbolic means to elate both.

Appendixes

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Appendix 1

Gazetteer of Neolithic and Early Bronze Age

Sites in the Cycladic Islands

Every neolithic or early bronze age site in the Cycladic islands known to the author is listed here, as are finds cited by earlier authors, such as Fimmen or Blinkenberg, which are known to come from specific islands, although the exact findspot is not recorded.

For reasons of space it is not possible to give a full documentation for prehistoric sites discovered during the author's site surveys in the Cyclades. It is planned that these sites and the sherd material found on the surface at them will be published in detail in a later article, together with additional material relating to later periods. Here they are simply named, located by means of a map reference, and where possible assigned to a specific culture. As a check list of sites, however, the gazetteer should be a complete inventory of those known up to the summer of 1969.

Sites are listed and numbered by island. The map reference, given in brackets after the name of the site, is to the 1 : 50,000 AEGEAN series (Geographical Section, General Staff, no. 4468) published by the War Office in 1944. Where no specific sheet is indicated, the sheet name is the same as that of the island in question.

Neolithic Period (see fig. App. 1.1)

KEA

1. Kephala (881089). Important settlement and cemetery of the Attic-Kephala culture (Caskey 1962; 1964b; 1966).

MELOS

1. Agrilia ('Kimolos' 982047). Settlement of the Saliagos culture, visited ACR 13/2/63 and 15/4/64. Unpublished (cf. Belmont and Renfrew 1964, 399; Evans and Renfrew 1968, 75).

MYKONOS

1. Mavrispilia (785810). Settlement of the Saliagos culture, with one sherd apparently of Grotta-Pelos type (Belmont and Renfrew 1964).

ANTIPAROS

1. Saliagos ('Paros' 530356). Important type-site of the Saliagos culture (Evans and Renfrew 1968).
2. Vouni (483327). Settlement of the Saliagos culture (Evans and Renfrew 1968, 74–75, fig. 74 and pl. LVI).

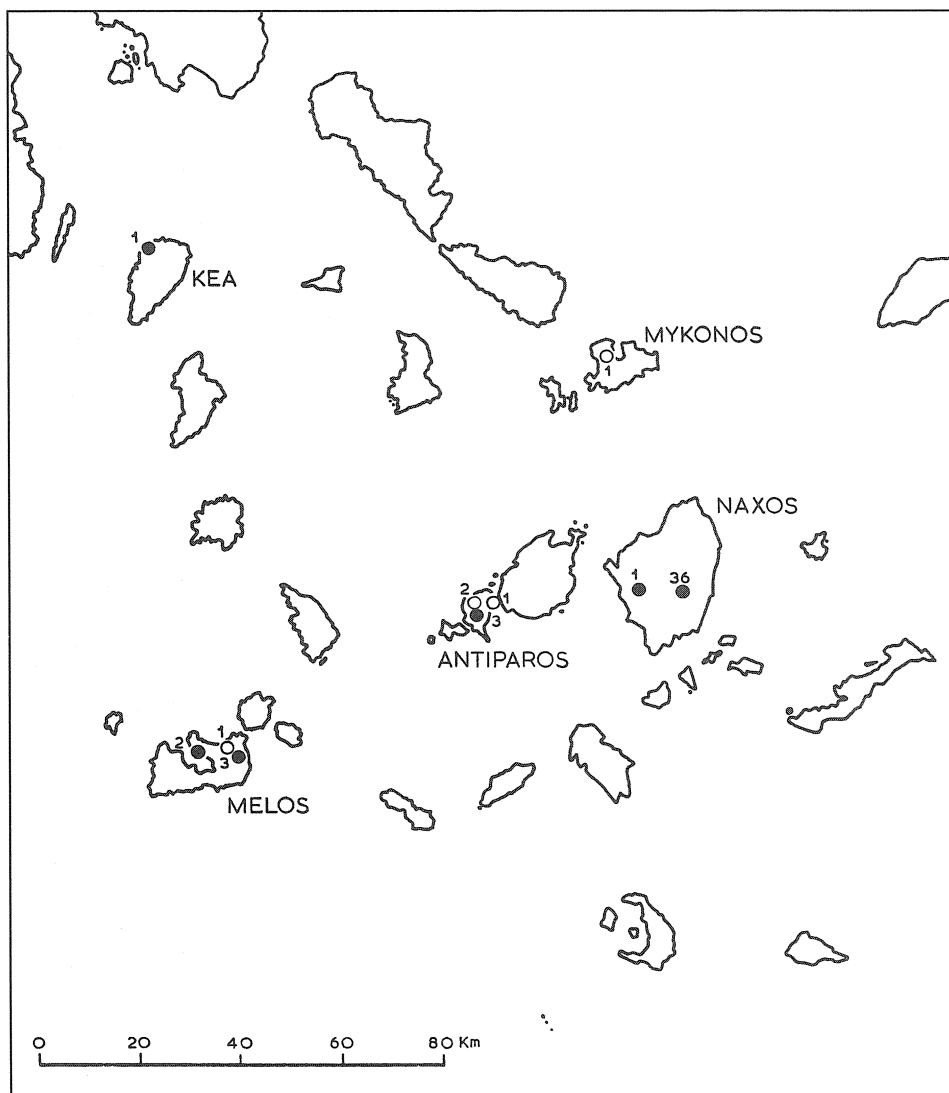


FIG. APP. 1.1 Neolithic sites in the Cycladic islands. Settlements of the Saliagos culture are shown as open circles.

Melos: 1, Agrilia; 2, Adhamas; 3, Dhemenegaki; **Antiparos:** 1, Saliagos; 2, Vouni; 3, Cave; **Naxos:** 1, Sangri; 36, Cave of Za; **Mykonos:** 1, Mavrispilia; **Kea:** 1, Kephala.

3. The Cave (c. 485285). Neolithic sherds found by Professor G. Bakalakis (1969, 126) and Renfrew (1965, fig. 5a).

NAXOS

1. Sangri (825335). Seated marble figurine, now in Naxos museum, reportedly found near the modern village of Sangri (Cook 1946; Weinberg 1951; Renfrew 1965, fig. 3).
36. Spilaio tou Za (c. 885320). Cave with prehistoric finds, including a jar with pierced lugs resembling those of the Grotta-Pelos culture, and bone spatulae probably of neolithic date, now in the Apeiranthos Museum. Unpublished.

OTHER FINDS

A figurine similar to that from Sangri, and said to come from Amorgos is in Brussels (Verhoogen 1930) but the provenance is uncertain. A standing figurine of similar style, again of uncertain provenance but reputedly from Amorgos, is in Oxford (Renfrew 1969a, 29 and pl. 1, c). A pressure-flaked fragment of an arrowhead or point, resembling those of the Saliagos culture and found at Minoa in Amorgos ('Amorgos West' 202077) is in the Chora Museum, Amorgos.

Finds of Melian obsidian have been made in various Aegean contexts throughout the neolithic period (Renfrew, Cann and Dixon 1965). The two obsidian quarries of Melos, Melos 2 and Melos 3 respectively, are at Adhamas (919028) and at Dhemenegaki (Kimolos' 014006). It is planned that finds made at these two locations will be published in detail in a future article.

A number of stone axes in the Ashmolean Museum in Oxford, supposedly from Melos, are a further indication of neolithic occupation there, if they are really from that island (Renfrew 1965, 23 f.).

Professor Schachermeyr (1955, 138 and fig. 35) reports a pattern-burnish sherd from Paros town (i.e. from Paroikia). It seems likely that this sherd, which through his kindness I have examined, was decorated originally with white paint, now disappeared, and the neolithic date is doubtful.

Early Bronze Age (see figs. App. 1.2–1.5)

KEA

2. Aghia Irini (878075). Important early bronze age (and later) settlement excavated by Caskey (pl. 14, 2). The finds relate principally to the Korakou culture of the mainland, with some resemblances, especially among the figurines to the Keros-Syros culture. There are finds also resembling the Lefkandi group and the Kastri group of the Keros-Syros culture (Caskey 1964b; 1970).

OTHER FINDS

Welter (1954, 64) spoke vaguely of 'prehistoric remains' below the archaic temple of the Greek city at Koressia. Blinkenberg (1896, 9, fig. 2) illustrates a marble figurine of the Keros-Syros culture said to be from the island, which, like the example preserved in the Kea museum, may derive from Aghia Irini. No Grotta-Pelos finds are known.

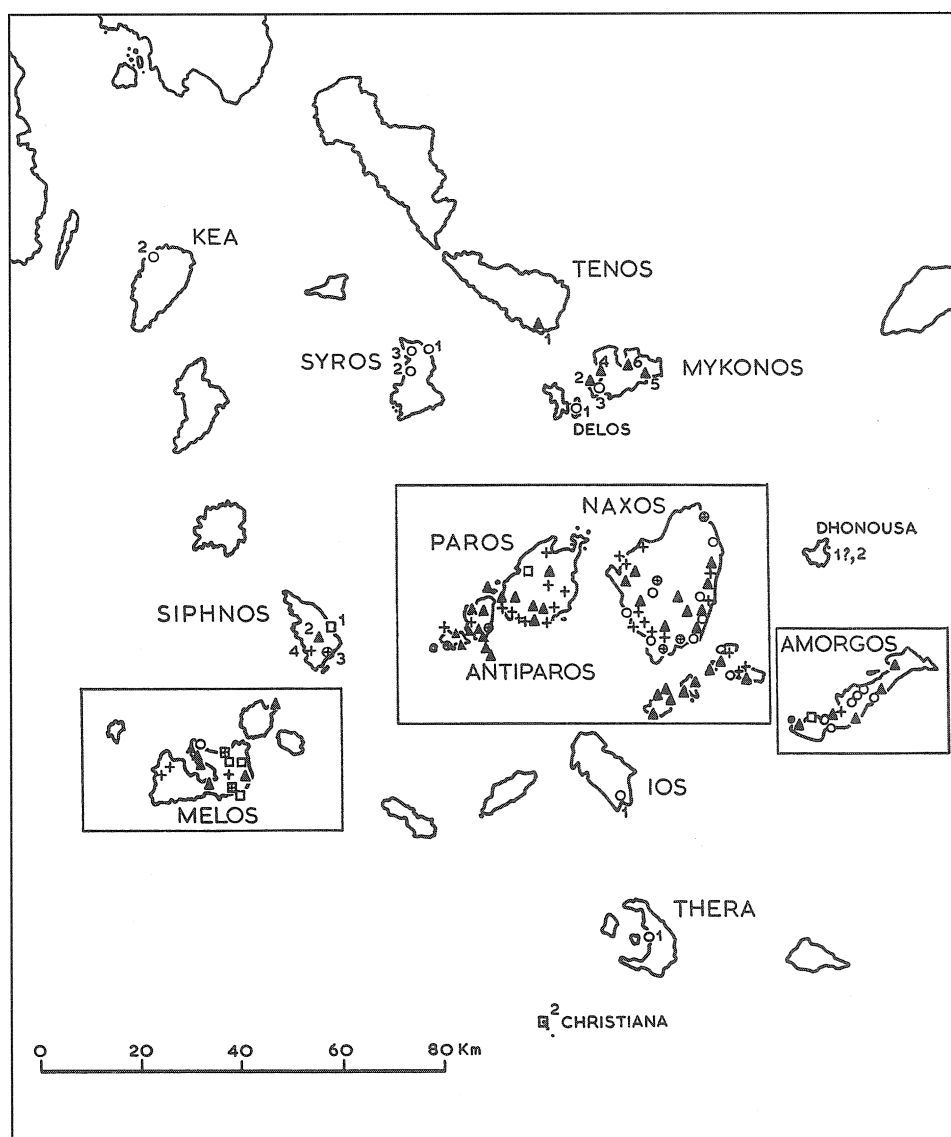


FIG. APP. 1.2 Sites of the third millennium BC on the Cycladic islands. Crosses denote settlements or cemeteries of the Grotta-Pelos culture; circles, those of the Keros-Syros culture; squares, those of the Phylakopi I culture. Triangles indicate sites of uncertain date.

Kea: 2, Aghia Irini; **Syros:** 1, Chalandriani; 2, Pidima; 3, Aghios Loukas; **Delos:** 1, Kynthos; **Mykonos:** 2, Anavoulousa; 3, Dhiakophtis; 4, Bouka; 5, Divounia; 6, Palaikastro; **Siphnos:** 1, Kastro; 2, Aghios Andreas; 3, Akrotiraki; 4, Vathy; **Ios:** 1, Manganari; **Thera:** 1, Phira; 2, Christiana.

Third millennium sites of Melos, Paro-Naxia and Amorgos are shown in greater detail on figs. App. 1.3–1.5.

KYTHNOS

No EBA site known at present. But the important hoard of tools, purchased by the British Museum in 1866 (pl. 17; Renfrew 1967a, 7) is said to be from the island. It is of Keros-Syros culture date.

SERIPHOS

No EBA site is yet known. Blinkenberg (1896, 22, fig. 5) illustrates a conical pyxis of the Phylakopi I culture, said to be from Seriphos. He cites also two figurines in the Berlin Antiquarium (Majewski 1935, nos. 173 and 257).

SIPHNOS

1. Kastro (201287). Settlement with a few sherds of the Phylakopi I culture (Brock and Mackworth Young 1949, pl. 12, 6 and 8). A cylindrical pyxis of the Grotta-Pelos culture in the Apollona museum may possibly be from this site. Excavated by Brock and Mackworth Young.
2. Aghios Andreas (178265). Important fortified settlement of uncertain date. Excavated by Tsountas (1899, 130) who found 'one or two' Early Cycladic sherds, and more of Mycenaean date (cf. Fimmen 1924, 14). My visit on 8/2/63 (with Mr Rob Dyer) produced three pieces of obsidian, a few possibly Mycenaean sherds and about 100 of Greek or Roman date. The first occupation of this site may well have been after the EBA period.
3. Akrotiraki (180233). Settlement and cemetery, the latter excavated by Tsountas with finds both of the Grotta-Pelos and Keros-Syros cultures. Visited ACR 8/2/63. (Pollak 1896, 210; Tsountas 1899.)
4. Vathy (c. 146243). Cemetery excavated by Tsountas (1899, 76) yielding finds of the Grotta-Pelos culture.

OTHER SITES

Mackenzie (1897, 85) reported pottery and obsidian at an unspecified site on the north of the island. I found small quantities of obsidian fragments at Aspropyrgos (192234) and between Akrotiraki and Phidioni (175225).

MELOS

2. Adhamas, Sta Nychia ('Milos' 919028). Important obsidian source with several chipping floors. Visited ACR 15/2/63 and 14/4/69. (Mackenzie in Atkinson et al. 1904; Renfrew, Cann and Dixon 1965.)
3. Dhemenegaki ('Kimolos' 014006). Important obsidian source with several chipping floors. Visited ACR 14/2/63 and 10/4/64. (Mackenzie 1897, 77; Renfrew, Cann and Dixon 1965.) Mackenzie also refers (in Atkinson et al. 1904, 245) to early walls at Komia, west of Dhemenegaki, but I was unable to find these.
4. Phylakopi ('Kimolos' 984053). Major settlement of the Grotta-Pelos, Phylakopi I and later cultures, with rock-cut tombs of Phylakopi I and probably Middle Cycladic date. Excavated by the British School of Archaeology at Athens, largely under the immediate supervision of Duncan Mackenzie (Mackenzie 1963; Atkinson et al. 1904), and later by Dawkins and Droop (1911). Numerous other workers have commented on the site.
5. Kapari ('Kimolos' 988049). Small settlement (or possibly cemetery?) of Phylakopi I and later date. Visited ACR on 15/4/64. (Cf. Papadopoulou-Zapheirou 1966, 387.)

6. Asprochorio ('Kimolos' 004036). Damaged rock-cut tombs, yielding several complete pots of Phylakopi I (or Phylakopi II) date, now in the Melos museum. Visited ACR 15/4/64.
7. Phiropotamos ('Milos' c. 910060). Findspot of a jar with narrow mouth and stamped concentric circles (pl. 8, 9), reminiscent of those of the Keros-Syros culture. (Cf. Papadopoulou 1965, 514.)
8. Trypiti ('Milos' c. 920035). Findspot of a marble folded-arm figurine now in the Melos Museum. (Cf. Zapheiropoulou 1967, 465 and pl. 347a.)
9. Areti ('Milos' 905043). Dense scatter of obsidian waste and artefacts, probably of neolithic or EBA date. Visited ACR 9/4/64. Unpublished unless mentioned by Mackenzie (1867, 88).
10. Pelos ('Kimolos' 979019). Settlement and cemetery of the Grotta-Pelos culture, the cemetery excavated by Edgar (1897, 3). Site re-located by ACR 16/2/63; graves not visible.
11. Aghios Pandelemon ('Kimolos' 982984). Settlement of Grotta-Pelos, Phylakopi I and Phylakopi II cultures, and cemetery of Grotta-Pelos culture. Has yielded two cylindrical pyxides, now in the Melos museum. Visited ACR 20/4/64. (Cf. Papadopoulou-Zapheiropoulou 1966, 387).
12. Stavros ('Kimolos' 955974). Prehistoric settlement, probably of EBA date. Visited ACR 15/4/64. Unpublished.
13. Spathi ('Kimolos' ? c. 995960). Rock-cut tombs resembling those of Phylakopi and presumably of Phylakopi I date (Papadopoulou-Zapheiropoulou 1965, 513).
14. Samari ('Milos' 845035). Extensive remains of walls of EBA settlement, probably that served by the Grotta-Pelos cemetery at Kalogries. Visited ACR 13/4/64. (Cf. Mackenzie 1897, 86.)
15. Kalogries ('Milos' 847037). Small cemetery of Grotta-Pelos culture. Visited ACR 13/4/64. (Cf. Papadopoulou 1965, 508; Renfrew 1964, pl. [Capital SigmaT], 2.)
 - . Ayiasmata (precise location unknown). Cist grave yielding a stone house model (Zapheiropoulou 1969, 406).

OTHER SITES

Small scatters of obsidian have been found at several other sites in Melos. Bosanquet (in Atkinson et al. 1904, 229 n. 4) refers to a cemetery at Angathia 'in the southern horn of the island'. The Angathia region is, however, on the west of the island, and the cemetery may be identical to that at Kalogries. The most important find from Melos without specific provenance is the elaborately carved chlorite schist pyxis now in Munich (pl. 15, 1; Zervos 1957, figs. 28–29; Blinkenberg 1897, 58).

KIMOLOS

1. Kentro (072130). Considerable scatter of obsidian, the site presumably of neolithic or EBA date. Visited ACR 12/2/63. Unpublished.

OTHER SITES

The site at Ellenika or A. Andreas reported by Bent (1885, 55) is probably that whose Geometric cemetery has been investigated by Kontoleon and Papadopoulou (1965, 514; 1966, 387). Blinkenberg published as from Kimolos a schematic figurine of marble of the

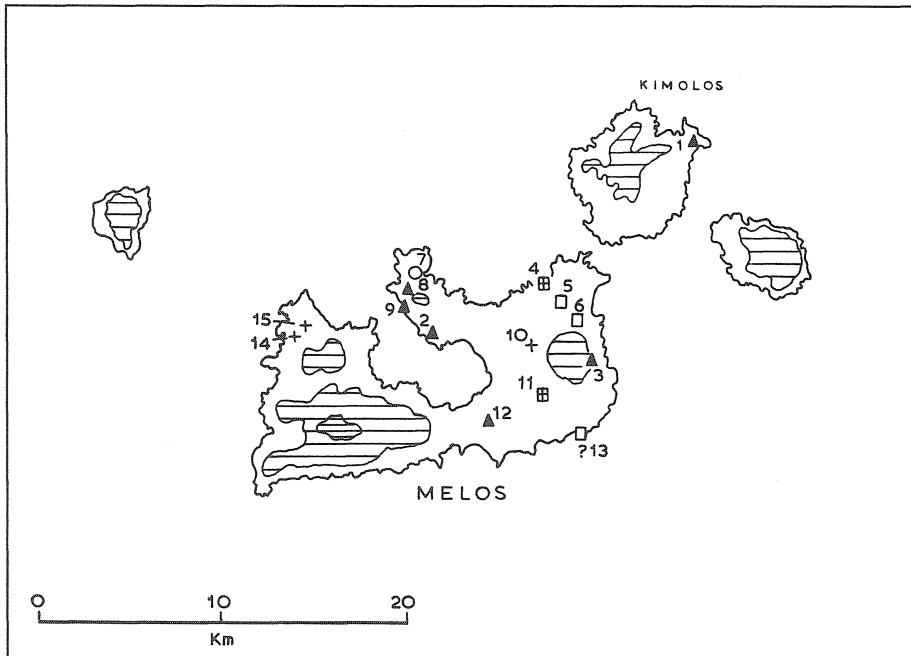


FIG. APP. 1.3 Sites of the third millennium BC on Melos. Crosses denote sites of the Grotta-Pelos culture; circles, finds of the Keros-Syros culture; squares, sites of the Phylakopi I culture; and triangles, sites of uncertain date.

Kimolos: 1, Kentros; **Melos:** 2, Adhamas; 3, Dhemenegaki; 4, Phylakopi; 5, Kapari; 6, Asprochorio; 7, Phiropotamos; 8, Trypiti; 9, Areti; 10, Pelos; 11, Aghios Pandlemon; 12, Stavros; 13, Spathi; 14, Samari; 15, Kalogries.

Grotta-Pelos culture, now in Athens (Nat. Mus. 3937, cf. Majewski 1935, no 38; Fimmen 1924, 15; Zervos 1957, fig. 56, b).

ANDROS

No EBA sites are known from this island, although a 'frying pan', perhaps of the Kampos group in the later Grotta-Pelos culture is said to be from the island. It is now in the British School of Archaeology at Athens (Frankfort 1927; Bossert 1960, 5).

TENOS

1. Vryokastro (Akroterion Ourion) (630883). Fortified Middle and Late Cycladic settlement whose occupation may extend back to the EBA. Visited ACR 14/2/64. (Cf. Scholes 1956, 13.)

OTHER FINDS

A stone axe was reported from a cave near the village of Kardhiani (Patroni 1895, 398). Bent (1888, 82) refers to a marble figurine with a crescent on its head, said to come from this island.

SYROS

1. Chalandriani (405855). Important fortified stronghold (Kastri), settlement and cemetery (pl. 14, 1 and 21, 1). The settlement and Kastri excavated by Tsountas (1899) and the Kastri more recently by Frau Fischer-Bossert (Bossert 1967). All the finds are of the Keros-Syros culture, some of them of the Kastri group. Many scholars have referred to this site. (See Fimmen 1924, 14; Caskey 1964c; and, for finds from the excavations of Stephanos, Zervos 1957, figs. 192–96.)
2. Pidima (c. 370800). Tsountas (1899, 79) reported a small cemetery with three graves. The finds included three marble idols, not now specifically identifiable. Since all the figurines now known from Syros are of the Keros-Syros culture, however, it may be assumed that Pidima is also probably of that date.
3. Aghios Loukas (? c. 373852). Tsountas (1899, 79) excavated 79 graves at this cemetery, with finds resembling those of Chalandriani. It may thus be ascribed to the Keros-Syros culture. But its use lasted into the middle bronze age, as is shown by the contents of one grave (Tsountas 1899, 94 and pl. 9, 6, 24 and 27). The pyxis (Tsountas 1899, pl. 9, 24) in shape and decoration closely resembles those of the Phylakopi I culture.

MYKONOS

2. Anavolousa (735775). Scatter of pottery and obsidian of neolithic or EBA date (Belmont and Renfrew 1964, 396).
3. Dhiakophtis (? c. 744763). Grave goods from tombs here of the Keros-Syros culture are preserved in the Mykonos museum (Belmont and Renfrew 1964, 398).
4. Bouka (c. 754804). A surface scatter of sherds of EBA date. One incised sherd (Bakalakis 1964, fig. 17.1) may be of the Grotta-Pelos culture.
5. Divounia (c. 836770). A surface scatter of sherds, probably of EBA date (Bakalakis 1964, 556).
6. Palaikastro (c. 815805). A thick scatter of sherds of MBA and later times. The settlement may go back to the EBA period (Scholes 1956; Bakalakis 1964, 556).

DELOS

1. Kynthos ('Mikonos' 702731). Important hilltop settlement of the Keros-Syros culture excavated by the French School of Archaeology (Plassart 1928, 11).

OTHER FINDS

A marble figurine in Berlin (Majewski 1935, pl. xxiii; Blinkenberg 1896, 57), reputedly from Delos, is of the Plastiras type (Renfrew 1969a, 6). It may thus be dated to the Grotta-Pelos culture.

RHENEIA

Ross (1842, 52) cites a marble figurine from this island. (Cf. Fimmen 1924, 14).

PAROS

1. Paroikia (573394). Important settlement of the Phylakopi I culture and the later bronze age, excavated by Rubensohn (1917), with possible traces of a Grotta-Pelos culture occupation. Visited ACR 8/4/63.
2. Plastiras (630430). Cemetery of the Grotta-Pelos culture excavated by Doumas (1963, 283 and pl. 329). Visited ACR 10/4/63 (pl. 25, 1).

3. Pounta (540352). Scatter of sherds and obsidian. A pyxis lid in the Paros Museum with incised concentric circles probably dates this site to the later part of the EBA. Visited ACR 12/4/63. Unpublished.
4. Episkopiana (c. 560350). Cemetery of cist graves, doubtless of EBA date, reported by Tsountas (1898, 139).
5. Aghios Nikolaos (Kampos) (532322). Cemetery of cist graves of the later Grotta-Pelos culture excavated by Varoucha (1926, 98). Visited ACR 12/4/63.
6. Avyssos (c. 577288). Settlement and cemetery excavated by Tsountas (1898, 139 and 175). The cemetery yielded finds of the Grotta-Pelos culture (Tsountas 1898, 161). At the settlement traces of copper slag were found. Probably this is the site which Mackenzie indicated as Akrotiri (Mackenzie 1897, 87; 1898, 22); it is still known by this name to the local inhabitants. Visited ACR 12/4/63; graves not visible.
7. Kamari (uncertain location, perhaps c. 5732). Cemetery where Tsountas (1898, 139) noted four cist graves, doubtless of EBA date.
8. Levkais (c. 625360). Cist graves reported by Tsountas (1898, 140). Finds known from Levkais are of the Grotta-Pelos culture (pl. 2, 3 and 4; Renfrew 1969a, pl. 1, d and 2, e).
9. Kostos (c. 635382). Cist graves, doubtless of EBA date, near this village were reported to Tsountas (1898, 140), although he was not able to locate them.
10. Tshipidon (c. 660345). A marble *kandila* in the Ashmolean Museum, Oxford (AE 422) is reliably reported from this village, now known as Marpessa. It doubtless derives from a cist grave of the Grotta-Pelos culture.
11. Messada (uncertain location, perhaps c. 670334). Tsountas (1898, 139) was told of EBA graves near this village, which yielded two marble figurines. The cemetery was earlier mentioned by Ross (1840, I, 51). (Cf. also Rubensohn 1949, 1800.)
12. Drios (c. 639301). Cemetery of cist graves excavated by Tsountas (1898, 139). Seven figurines of the Grotta-Pelos culture from Drios are in the Paros Museum (cf. Renfrew 1969a, pl. 7, h). Visited ACR 15/4/63; graves not visible.
13. Pyrgos (630290). Important settlement and cemetery of the Grotta-Pelos culture excavated by Tsountas (1898, 158 and 168). Visited ACR 15/4/63. Fimmen (1924, 14) is probably wrong in equating this site with Mackenzie's Akrotiri (Mackenzie 1898, 22); see Paros 6 above.
14. Mnimoria (between Pyrgos and Panaghia, thus? c. 625295). EBA graves excavated by Tsountas (1898, 139 and 156).
15. Panaghia (? c. 620305). Cemetery of the Grotta-Pelos culture at which 23 cist graves were opened by Tsountas (1898, 139 and 155).
16. Galana Krimna (c. 610290). Cemetery of EBA date, where Tsountas (1898, 139 and 155) reported 28 cist graves.
17. Glypha (605283). Cemetery of the Grotta-Pelos culture, where Tsountas (1898, 139 and 155) excavated ten graves.

OTHER FINDS

Rubensohn (1949, 1800) records that marble vessels in the Paros Museum were found near the village of Isterni (c. 665395). I have not been able to locate these vessels, nor learn of finds at the village. No well-documented finds of the Keros-Syros culture come from Paros, although Bent (1884, 50, fig. 70) purchased there a folded-arm figurine which is, however,

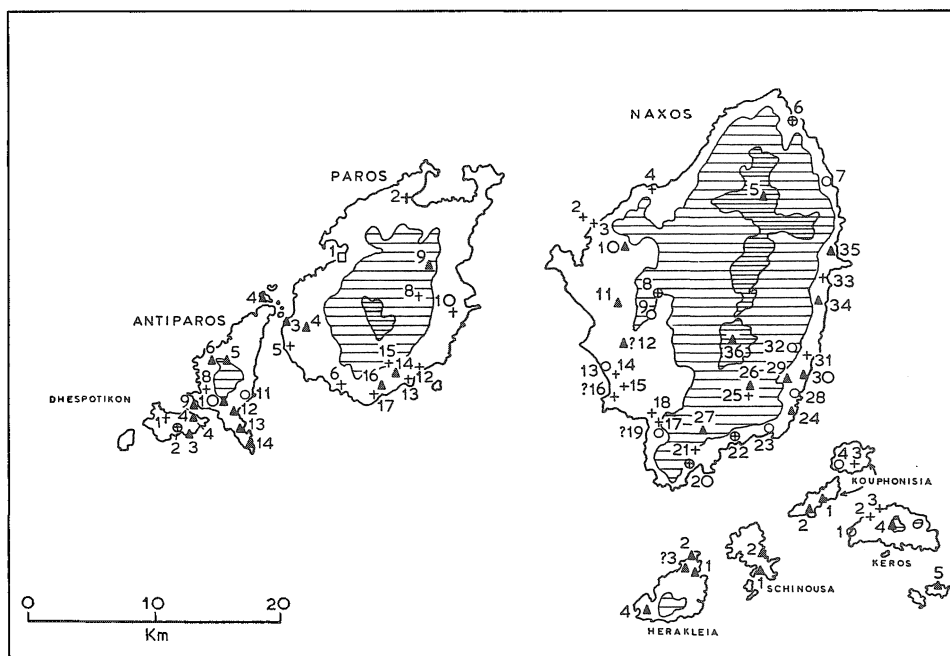


FIG. APP. 1.4 Sites of the third millennium BC on Naxos, Paros, Antiparos and neighbouring islands. Crosses denote sites of the Grotta-Pelos culture; circles, those of the Keros-Syres culture; squares, those of the Phylakopi I culture; triangles, those of uncertain date. Site names for each island are listed in the Gazetteer.

unusual in showing facial features (Pryce 1928, pl. II, A 26). Bakalakis (1969, 131) mentions prehistoric sherds in the Kalabaki and Aghios Nikolaos caves.

ANTIPAROS

4. Phira (518362). Pair of islands north of Antiparos with EBA cist grave cemetery, on Dhiplo, the southern of the two, recently and illicitly excavated. Visited ACR 20/4/63. Unpublished.
5. Vaivouna (c. 482314). Small cemetery of eight EBA cist graves recently and illicitly excavated. Visited ACR 17/4/63. Unpublished.
6. Psaroga (c. 465317). EBA cemetery reported to Tsountas (1898, 140) but not excavated by him.
7. Georgoulas (uncertain location). EBA cemetery reported to Tsountas (1898, 140) but not excavated by him.
8. Krassades (462286). Cemetery with at least 50 cist graves excavated by Tsountas (1898, 161) and yielding finds of the Grotta-Pelos culture. This is almost certainly the 'poorer cemetery' described by Bent (1884, 477). Visited ACR 19/4/63.
9. Tsimindiri (452277). Island between Antiparos and Dhespotikon with at least one cist grave of Early Cycladic date. Visited ACR 18/4/63. (Cf. Bent 1885, 404).
10. Site A (uncertain location between Krassades and Apantima). Two groups of Early Cycladic cist graves in this area were reported to Tsountas (1898, 140).

11. Apantima (506285). Cemetery of EBA cist graves reported by Tsountas (1898, 140). Visited ACR 19/4/63: graves not visible. This may be the 'richer cemetery' reported by Bent (1884, 47) with finds of the Keros-Syros culture. But Aghios Sostis would equally match his description.
12. Soros (? c. 492270). Cemetery of EBA cist graves reported by Tsountas (1898, 140).
13. Aghios Sostis (497252). Cemetery of EBA cist graves reported to ACR on 19/4/63 by a local inhabitant, and documented by 'plakes', the large stone slabs used to make cists, in the neighbouring field wall. It is possible that this cemetery and that at Soros are identical.
14. Petalidhi (c. 504236). Cemetery of EBA cist graves reported by Tsountas (1898, 140).

DHESPOTIKON

1. Zoumbaria ('Antiparos' 423262). Early Cycladic settlement and cemetery of cist graves. Tsountas (1898, 163) excavated fourteen of these, finding artefacts of the Grotta-Pelos culture, and Zapheiropoulos a further twenty (cf. Bossert and Erhardt 1965). As well as pottery of the Grotta-Pelos culture, Zapheiropoulos (1960, 247) reported sherds in the area of 'frying pan' shape and decorated with spirals of 'Syros type', i.e. probably of the Keros-Syros culture. Visited ACR 18/4/63 and August 1965.
2. Leivadhi ('Antiparos' 430255). Early Cycladic cemetery excavated by Tsountas (1898, 163) and recently by unauthorised diggers. The earlier finds are of the Grotta-Pelos culture, and there are indications that the cemetery continued in use into the time of the Keros-Syros culture. Visited ACR 18/4/63 and August 1965.
3. Cheiromylos ('Antiparos' 437250). Settlement of EBA date investigated by Tsountas (1898, 176). On my visit, on 18/4/63, I found sherds of EBA pottery and two fragments of lead.
4. Panaghia ('Antiparos' 460264). Tsountas (1898, 141) reported talk of Early Cycladic cist graves at this spot, but I saw none on my visit on 19/4/63.

OTHER FINDS

A footed marble vessel (inventory number 652) and a folded-arm figurine in the Paros museum, both from Dhespotikon, indicate that further graves of the Keros-Syros culture have been found there.

NAXOS

2. Grotta ('Naxos' 774415). Important settlement of the Grotta-Pelos culture, excavated by Professor N. Kontoleon (1949–61). Largely unpublished. Finds of the Keros-Syros culture have been made at Aplomata some 300 m to the north-east.
3. Palati ('Naxos' 780413). Finds by Welter (Karo 1930, 132) were probably of Grotta-Pelos type, like those of Grotta nearby.
4. Akrotiri ('Naxos' c. 830440). Important cemetery of 22 graves excavated by Doumas (1962, 278), yielding finds of the Grotta-Pelos culture. Visited ACR 11/8/63.
5. Pherendaki ('Naxos' c. 915450). Early Cycladic cist graves excavated by Stephanos (1908, 115).
6. Ormos Apollonos ('Naxos' c. 935488). Cist graves excavated by Stephanos (1908, 115), yielding copper axes and a dagger of the later Keros-Syros culture (Papathanasopoulos 1961–62, 145) and a marble *kandila* of the Grotta-Pelos culture. A further marble *kandila* from this site is in the Ashmolean Museum, Oxford (AE 420). Visited ACR July 1967: graves not visible.

7. Lionas (Avdheli) ('Naxos' c. 960440). Built graves and traces of building excavated by Doumas (1963, 279), yielding finds of the Keros-Syros culture.
8. Aghioi Anargyroi ('Naxos' c. 840350). Important cemetery of 22 cist graves (fig. 19.9) excavated by Doumas (1962, 272) yielding finds of the Grotta-Pelos culture. A separate group of graves of the Keros-Syros culture was found in this vicinity.
9. Aphendika ('Naxos' 815343). Cemetery of 170 graves investigated by Stephanos (1910, 270). The finds included a fragmentary marble seated figurine of the Keros-Syros culture (Papathanasopoulos 1961–62, pl. 80). Visited ACR 13/7/63.
10. Melanes ('Naxos' c. 810385). Stephanos investigated a small group of Early Cycladic graves near the village (Stephanos 1910, 209).
11. Rizokastelia ('Naxos' 794349). Prehistoric settlement reported by Stephanos (1910, 273). During my visit on 10/8/63 I observed 13 pieces of obsidian with middle and late bronze age pottery, so that Early Cycladic occupation of the site is not certain. (Cf. Scholes 1956, 12.)
12. Kamenio Mitato ('Naxos' ? c. 800310). Stephanos (1904, 58) reported Early Cycladic graves.
13. Kastraki ('Karos' 783295). Settlement and cemetery of the Keros-Syros culture reported by Mackenzie (1898, 21) and Stephanos (1904, 60; 1908, 117; 1910, 209). Visited ACR 14/7/63; settlement observed but not graves.
14. Polichni ('Karos' c. 795285). Cemetery excavated by Stephanos (1904, 58), yielding finds of the Grotta-Pelos culture (Papathanasopoulos 1961–62, pl. 59, b).
15. Louros ('Karos' 800277). Cemetery excavated by Stephanos (1904, 58) with important finds of the late Grotta-Pelos culture (Papathanasopoulos 1961–62, 132). Visited ACR 14/7/63; no graves visible.
16. Phyrroges ('Karos' ? 798275). Cemetery of the Grotta-Pelos and Keros-Syros culture (Papathanasopoulos 1961–62, 138) excavated by Stephanos (1904, 57; 1905, 216), who found 120 graves and traces of a settlement. Visited ACR 14/7/63.
17. Lakkoudes ('Karos' ? c. 820250). Cemetery with 25 graves of the Grotta-Pelos culture excavated by Doumas (1962, 274). Visited ACR.
18. Agioso ('Karos' c. 816260). Cemetery of Early Cycladic cist graves reported by Zapheiropoulos (1965, 506). No datable finds. Visited ACR 19/7/63.
19. Roon ('Karos' ? c. 820250). Early Cycladic graves excavated by Stephanos (1908, 115), yielding a folded-arm figurine of the Keros-Syros culture (Papathanasopoulos 1961–62, 147; cf. Zapheiropoulos 1965, 506).
20. Karvounolakkoi ('Karos' 849215). Extensive cemetery of cist graves of which Stephanos excavated 82 (1903, 53; 1905, 216) with finds of both the Grotta-Pelos and Keros-Syros cultures (Papathanasopoulos 1961–62, 109). Visited ACR 18/7/63.
21. Keli ('Karos' 852222). Cemetery where Stephanos excavated 10 graves (Stephanos 1903, 53), yielding finds of the Grotta-Pelos culture (Papathanasopoulos 1961–62, 113). On my visit on 18/7/63 I found a sherd which seems to be of the Phylakopi I culture.
22. Spedos ('Karos' 885237). Important fortified settlement of the Grotta-Pelos and Keros-Syros culture (cf. Papathanasopoulos 1961–62, 114) excavated by Stephanos (1906, 87). Incised slabs reported by Bardanis (1966, 74). Visited ACR 18/7/63 and 7/9/70.
23. Panormos ('Karos' 914243). Fortified stronghold of the Keros-Syros culture excavated by Doumas (1964, 411), with nearby graves, five of which were excavated by Stephanos

- (1906, 87; Papathanasopoulos 1961–62, 411). Incised slabs reported by Bardanis (1966, 71). Visited ACR 18/7/63 (pl. 21, 2).
24. Korphi t'Aroniou ('Karos' 933262). Early Cycladic dwelling excavated by Doumas (1963, 276; 1965), following the discovery by Bardanis (1966) of stones with incised scenes. Visited ACR 18/7/63.
 25. Aïla ('Karos' 900290). Cist graves excavated by Stephanos (1903, 53), yielding a pyxis in the style of the Grotta-Pelos culture and metal tools and cups of the middle bronze age (Papathanasopoulos 1961–62, pls. 62–65). Incised slabs reported by Bardanis (1966, 71). Visited ACR 17/7/63.
 26. Vardaki ('Karos' 907293). Group of cist graves, illicitly excavated. Incised stones reported by Bardanis (1966, 71). Visited ACR 17/7/63.
 27. Phionda ('Karos' c. 860240). When visiting the Pyrgos tou Cheimarrou on 17/7/63 I was informed by the local inhabitants of cist graves excavated at Phionda (? Philonda) and at Kamino. The peasants spoke of a 'Royal Family' grave at Phionda, with marble finds, which may refer to the discovery of a group of figurines in the Goulandrís collection (cf. Doumas 1969, nos. 308, 309, 312, 328, reputedly from Spedos).
 28. Kleidos ('Karos' 935272). Cist grave cemetery excavated by Stephanos (1906, 86). More recent unauthorised excavations apparently yielded metal daggers (*machairia*), so that some graves were presumably of the Keros-Syros culture. Incised slabs reported by Bardanis (1966, 74). Visited ACR 18/7/63.
 29. Bebekos ('Karos' c. 930280). A group of cist graves excavated unauthorisedly. Visited ACR 18/7/63. Unpublished.
 30. Xerakrotiro (Vounes) ('Karos' c. 945293). Cemetery with about 20 recently opened cist graves. Visited ACR 18/7/63. Unpublished.
 31. Kanaki ('Naxos' 945305). Two *kandiles* of the Grotta-Pelos culture are in the Ashmolean Museum, Oxford (AE 419, 421). And stone slabs (*plakes*) in the fields confirm that there was a cist grave cemetery at this spot. Incised slab reported by Bardanis (1966, 74). Visited ACR 16/7/63.
 32. Petasi ('Naxos' ? 925310). An unpublished letter of Duncan Mackenzie refers to a rectangular footed pyxis of stone with relief spirals from this place, very probably the one now in the National Museum in Athens (NM 5358; Zervos 1957, fig. 30). Some sherds in the Apeiranthos Museum are of Phylakopi I or Middle Cycladic date.
 33. Kambos tis Makris ('Naxos' 963364). Cemetery of 56 graves excavated by Stephanos (1906, 86; cf. Zapheiropoulos 1965, 506). All the finds published by Papathanasopoulos (1961–62, pls. 73–75) are of the Grotta-Pelos culture. Visited ACR 12/7/63.
 34. Lygaridia ('Naxos' 959348). Cemetery of Early Cycladic cist graves excavated by Stephanos (1906, 86; cf. Zapheiropoulos 1965, 505). Incised slabs reported by Bardanis (1966, 74).
 35. Moutsounas ('Naxos' c. 970375). Group of cist graves and traces of settlement reported by Zapheiropoulos (1965, 505). Inscribed slabs reported by Bardanis (1966, 73).
 36. Spilaio tou Za ('Naxos' c. 885320). Same remarks as in list of neolithic sites.

OTHER FINDS

The Apeiranthos Museum contains a large and important collection of Early Cycladic artefacts from various sites in south-east Naxos (Naxos 22 to 34 inclusive). The finds are of

the Grotta-Pelos, Keros-Syros and rarely Phylakopi I cultures. Several caves in Naxos have given scanty indications of possible prehistoric settlement, including the Spilaio tou Phida ('Naxos' c. 900370) and the Spilaio tou Kanavi. Fiedler (1841, 314 and pl. 5) describes a marble palette and figurine supposedly from Trymalia in Naxos. (Cf. Bosanquet 1897, 64)

DHONOUSIA

1. Achtia ton Agrilion (precise location unknown). Traces of settlement with obsidian reported by Zapheirpoulou (1967, 467).
2. Kato Mylos Platyvolias (precise location uncertain). Traces of prehistoric settlement with well preserved walls reported by Zapheirpoulou (1967, 467).

OTHER FINDS

The head of a marble figurine of the Keros-Syros comes from this island (Zapheirpoulou 1970, 48, fig. 2, right).

HERAKLEIA

1. Kastro ('Karos' 853122). Zapheirpoulou (1967, 466) reports prehistoric sherds, and I found fragments of obsidian on my visit on 29/7/63.
2. Aghios Georgios ('Karos' c. 850133). A fine obsidian blade, length 9.5 cm (pl. 26, 6, right), was found by an inhabitant near the village. Visited ACR 28/7/63. Unpublished.
3. Kambos Aghiou Athanasiou ('Karos' ? c. 845125). Traces of prehistoric settlement reported by Zapheirpoulou (1967, 465) and incised spirals on the rocks (Bardanis 1966, 75).
4. Aghios Mamas ('Karos' ? c. 815095). Traces of large prehistoric settlement and cist graves of early bronze age date (cf. Zapheirpoulou 1967, 465). Incised slabs reported by Bardanis (1966, 75).

OTHER FINDS

Ross (1840, II, 35) reports the purchase of marble figurines on the island.

SCHINOUSA

1. Tsingouri ('Karos' c. 900130). A thick scatter of Early Cycladic sherds reported by Zapheirpoulou (1967, 466).
2. Kastro tou Prophiti Ilia ('Karos' 905136). Scatter of numerous prehistoric sherds reported by Zapheirpoulou (1967, 466). On my visit on 27/7/63 I noticed only a couple of pieces of obsidian.

OTHER FINDS

A figurine in the Goulandris collection (Doumas 1969, no. 102) was purchased at Schinousa.

KOUPHONISIA

Two islands, the Epano Kouphonisi lying north of the Kato Kouphonisi. The term Kouphonisia is sometimes incorrectly used to designate the entire island group between Naxos and Amorgos, including Herakleia, Schinousa and Keros.

1. Panaghia (Kato Kouphonisi) ('Karos' 952188). Early Cycladic settlement reported here by Zapheirpoulou (1967, 467). Visited ACR 25/7/63 without observation of prehis-

toric material, although numerous Hellenistic sherds lie among the walls on the cliff below the church.

2. Nero (Kato Kouphonisi) ('Karos' c. 945182). Small early Cycladic settlement reported by Zapheirpoulou (1967, 466) together with graves. Visited ACR 7/9/70.
3. Sirma (Ano Kouphonisi) ('Karos' c. 980212). Scatter of sherds and obsidian, visited ACR 23/7/63. This may be the place from which sherds of the Grotta-Pelos culture have been recovered by Doumas. (Cf. also French 1964, 135.)
4. Loutra (Ano Kouphonisi) ('Karos' c. 965210). Figurine of the Keros-Syros culture found on the beach (Zapheirpoulou 1967, pl. 349, a).
5. Alonistria Chousouri (Ano Kouphonisi) ('Karos' 974215). Small cemetery of the Keros-Syros culture reportedly with adjoining settlement mentioned by Zapheirpoulou (1970, 48). Visited ACR 8/9/70.
6. Agrilia (Ano Kouphonisi) ('Karos' c. 968215) Major cemetery of 72 rock-cut graves excavated by Zapheirpoulou (1970, 49–50) with finds both of the Grotta-Pelos culture, including a 'frying pan' and an incomplete figurine of Louros type, and of the Keros-Syros culture. Visited ACR 8/9/70.

OTHER FINDS

Dümmmler (1886, 25, Beilage 1, 1) illustrated a sealstone said to come from the Kouphonisia.

KEROS

1. Dhaskalio (973162). Important settlement of the Keros-Syros culture opposite what is now a small island 50 m off shore. On Keros itself, rich finds indicate what may be the cemetery area. Excavated by Doumas (1964, 109) and further by Zapheirpoulou (1966, 381; 1968, 97). Incised slabs reported by Bardanis (1966, 75). Visited ACR 24/7/63 and 8/9/70.
2. Konakia (000174). Scatter of Early Cycladic sherds in sea cliff. Visited ACR 24/7/63. Unpublished.
3. Gerani (993169). Early Cycladic settlement reported by Zapheirpoulou (1967, 466; 1968, 381), with indications of walls. Visited ACR 8/9/70.
4. Megalo Kastro (005162). Walls of Early Cycladic settlement indicated by Zapheirpoulou (1967, 466). I was unable, on my visit on 24/7/63, to date these walls.
5. Antikeros: Prasia ('Karos' ? c. 040113). Scatter of prehistoric sherds and obsidian reported by Zapheirpoulou (1967, 466).

OTHER FINDS

Bardanis (1966, 75) has reported incised carvings on the rock at Rachidi. The celebrated marble musicians now in the National Museum in Athens were from a grave group on Keros (Kohler 1884, 156; Zervos 1957, figs. 302, 333–34). Several figurines in the Goulandris collection, and a remarkable marble bowl (Doumas 1969, 174, no. 329) are probably from the disturbed cemetery area opposite Dhaskalio island. Fragments of marble objects, including a bowl, have been found at Gialada, on the coast (at 996171) 400 m west of Konakia.

AMORGOS

1. Aghia Paraskevi (Amorgos West' c. 110040). Tsountas (1898, 138) refers to a single Early Cycladic grave here. (Cf. Dümmmler 1886, Beilage 1.)

2. Arkesine ('Amorgos West' 162068). Dümmler (1886, Beilage 2) illustrated the important finds from a double grave, subsequently studied by Bossert (1954, 23). The pottery seems to belong to the Amorgos group of the Keros-Syros culture, although some of the shapes are of the Phylakopi I culture, and some of the pottery may be as late as the Phylakopi II period. Tsountas excavated a further grave there (Tsountas 1898, 208).
3. Dokathismata ('Amorgos West' 183055). Settlement and cemetery with finds described by Dümmler (1886, Beilage 1, A and Beilage 2, A). Tsountas (1898, 138) reported 20 graves. The published finds are of the Keros-Syros culture, and the settlement (Tsountas 1898, 166) is doubtless of the same date. Visited ACR 11/6/64.
4. Phoinikies ('Amorgos West' c. 197073). Tsountas (1898, 139 and 146) refers to two Early Cycladic graves. (Cf. Dümmler 1886, Beilage 1.)
5. Kato Akrotiri ('Amorgos West' 198083). Finds of the Grotta-Pelos culture made by Tsountas (1898, 166) in what was probably a settlement. He refers to two graves nearby. Visited ACR 11/6/64.
6. Xilokeratidi ('Amorgos West' 205089). Early Cycladic graves indicated by Dümmler (1886, Beilage 1). The Katapola Museum has three vases from here, of which two are of the Keros-Syros culture. Visited ACR 10/6/64.
7. Kapros ('Amorgos West' 215093). Cemetery of at least 20 graves (Tsountas 1898, 138) with finds of the Keros-Syros culture illustrated by Dümmler (1886, Beilage 1, D; cf.

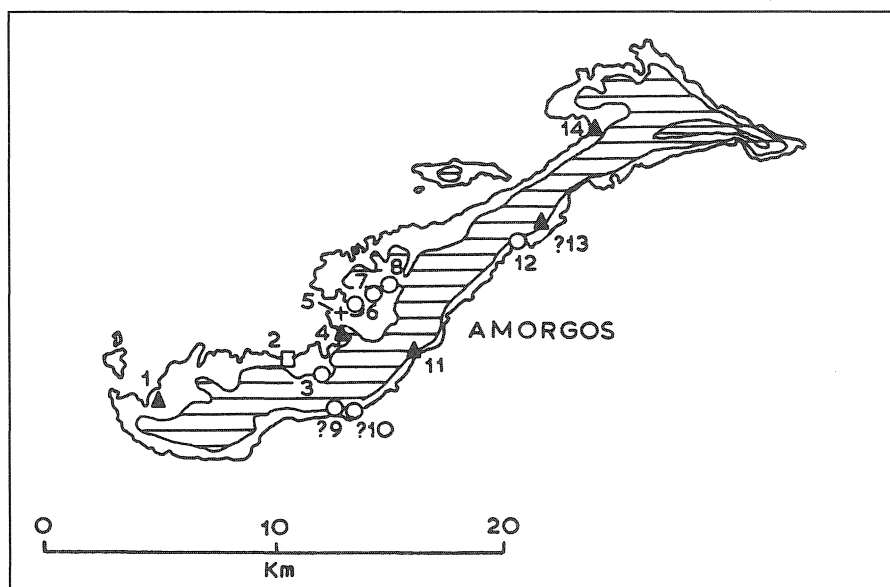


FIG. APP. 1.5 Sites of the third millennium BC on Amorgos. Crosses denote sites of the Grotta-Pelos culture; circles, those of the Keros-Syros culture; squares, those of the Phylakopi I culture; triangles, those of uncertain date.

1, Aghia Paraskevi; 2, Arkesine; 3, Dokathismata; 4, Phoinikies; 5, Kato Akrotiri; 6, Xilokeratidi; 7, Kapras; 8, Vouni; 9, Notina; 10, Stavros; 11, Kokkina Chomata; 12, Kapsala; 13, Aghios Georgios; 14, Aigiale.

Renfrew 1967a, 6). Dümmler (1886, 28) also observed walls here, although Tsountas (1898, 165) doubted their prehistoric date. Visited ACR 10/6/64.

8. Vouni ('Amorgos West' ? c. 220090). Dümmler (1886, 25) reported prehistoric graves containing bronze weapons, and therefore probably of the Keros-Syros culture.
9. Notina ('Amorgos West' ? c. 180040). Dümmler illustrated the contents of one grave of Keros-Syros date (Dümmler 1886, Beilage 1, 4 and 5). Tsountas (1898, 138) spoke of four graves with marble figurines. A further find (Dümmler 1886, Beilage 1, 3) appears to be of the Grotta-Pelos culture.
10. Stavros ('Amorgos West' ? c. 185040). Tsountas reported six graves (Tsountas 1898, 138 and 153) which are of the Amorgos group of the Keros-Syros culture.
11. Kokkina Chomata ('Amorgos West' ? c. 220060). Tsountas reported one grave here (Tsountas 1898, 138; Dümmler 1886, Beilage 1).
12. Kapsala ('Amorgos West' c. 278113). Tsountas reported 11 tombs at this spot, wrongly called Kephala by Dümmler (1886, Beilage 1). The finds (Tsountas 1898, 152) are of the Keros-Syros culture.
13. Aghios Georgios ('Amorgos East' ? c. 290130). Dümmler indicated prehistoric graves here (Dümmler 1886, Beilage 1; Tsountas 1898, 138).
14. Aigiale ('Amorgos East' c. 307162). Tsountas (1898, 138) reports an Early Cycladic grave in which was found a marble figurine (probably Majewski 1935, no. 247).

OTHER FINDS

Numerous further finds have come from this island (e.g. Kohler 1884, 160). They are chiefly of the Keros-Syros culture, although a few are of the Grotta-Pelos culture (e.g. Dümmler 1886, Beilage 2, F1). Unfortunately they have no precise provenance.

IOS

1. Manganari (c. 755915). Graindor (1904, 309) referred to Early Cycladic cist graves, which contained folded-arm figurines of the Keros-Syros culture, and a marble *kandila* of the Grotta-Pelos culture. He later published (Graindor 1921, 69) a folded-arm figurine and a *kandila* from Ios, which may be from this cemetery.

OTHER FINDS

In the Collection of the British School of Archaeology at Athens are two folded-arm figurines (Cat. nos. L. 253 and L. 254) from Ios. Wolters (1898, 462; 1900, 399) refers to a figurine of lead from Ios, and to marble figurines (1891, 49). Ross (1842, I, 52) mentions a grave group with a marble figurine. Blinkenberg (1896, fig. 3) illustrated a figurine from Ios with the feet of another on its head.

SIKINOS

A 'frying pan' of the Kampos group of the Grotta-Pelos culture (Blinkenberg 1896, 23, fig. 6) is said to come from this island.

PHOLEGANDROS

1. Panaghia (precise location uncertain). Site with Early Cycladic sherds mentioned by Miss K. Scholes (now Mrs Bolton) in an unpublished paper filed at the British School of Archaeology at Athens. This may be the settlement mentioned by Mackenzie (1897, 86).

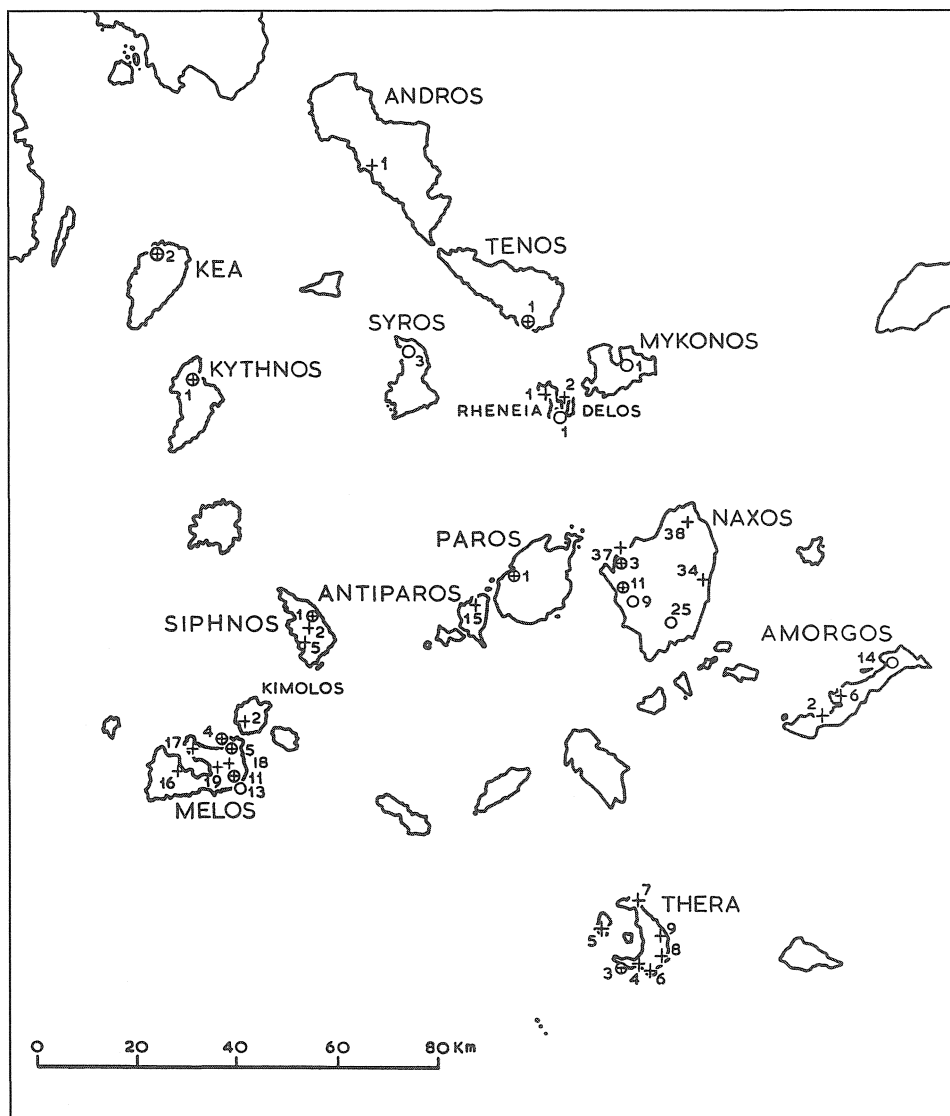


FIG. APP. 1.6 Later bronze age sites in the Cycladic islands. Circles denote sites of the middle bronze age; crosses, those of the late bronze age.

ANAPHI

No prehistoric finds are recorded from this island.

THERA

1. Phira (c. 793630). Early Cycladic cist graves found underlying the pumice in the quarries to the south of the modern town (Karo 1930, 135). The pumice was deposited

during the late bronze age eruption of the volcano. The finds include a steatite bowl, perhaps Minoan, and a folded-arm figurine assignable to the Keros-Syros culture.

2. Christiana (Small island 15 km south-west of Thera). A group of 16 pottery vases found here (Tsakos 1967, 464) may indicate a settlement. They have resemblances with forms of the Amorgos group of the Keros-Syros culture, but some may be as late as the middle bronze period.

OTHER FINDS

Two seated musicians, with marble vessels of the Keros-Syros culture, are said to come from a grave on Thera (Blinkenberg 1896, 17, fig. 4). Ross (1842, I, 52) speaks of a further grave group. A folded-arm figurine, supposedly from Thera, is in Copenhagen (Blinkenberg 1896, 9, Thera C; Renfrew 1969a, pl. 5, e). Two schematic figurines of the Grotta-Pelos culture are in the Phira Museum, with three *kandiles*. These probably, but not certainly, were found on the island. The museum also has a duck vase, a jar and other pottery of the Phylakopi I culture. It seems likely that the important middle and late bronze age site at Akrotiri (765570) as well as other later bronze age sites, was preceded by an early bronze age settlement.

Appendix 2

Local Groups with the Grotta-Pelos

and Keros-Syros Cultures of the Cyclades

The basic division of the Early Cycladic finds into three cultural assemblages was established in chapter 9. Although there is only limited material from the Phylakopi I culture, principally since only a single cemetery is known, finds of the Grotta-Pelos and Keros-Syros cultures are exceedingly abundant. In consequence, a definition is possible of groups of materials within these two cultural assemblages, where artefacts of specific type regularly occur in association. Both geographical and chronological factors, within the range of time and space of the culture itself, govern these associations. These groups may be regarded as sub-cultures, as recurrent assemblages of artefacts occurring always within the cultures already defined.

A treatment of these groups occurring within the Grotta-Pelos and Keros-Syros cultures is given below, together with a description of the Attic-Cycladic *Mischkultur*. This further group, centred upon eastern Attica, displays elements of both the Grotta-Pelos and Keros-Syros cultures.

1. The Lakkoudhes and Plastiras Groups of the Grotta-Pelos Culture

In general in the Grotta-Pelos cemeteries marble objects and clay pots are seldom found in the same grave. Only the schematic figurines (fig. 19.4) are regularly found with pots, as in Grave 100 and especially Grave 103 at Pyrgos, in Grave 111 at Leivadhi and in Doulas's cemetery at Akrotiri. They are in turn linked by associations with the marble rhyton (pl. 1, 4; Grave 117 at Krassades) and the footed *kandila* (pl. 1, 3; Grave 24 at Glypha). But the marble vessels are scarcely found with the pottery ones. That they belong broadly to the same culture is clear enough, and is at once obvious through a comparison of the *kandila*, the principal marble form (fig. 10.3, 4; pl. 1, 3), with the footed pottery jar (fig. 10.3, 2; pl. 3, 5), which is very common in the cemeteries. This distinction between graves with marble vessels and those without may not simply be a social phenomenon.

At the cemetery of Pelos in Melos, from which numerous pots are known (pl. 3), not a single object of marble was found. The lack of a source of marble in Melos might lead one to disregard this as a significant feature, but the museum in Melos has figurines of marble,

including schematic forms, so that they are found elsewhere on the island. In addition at the important cemetery at Lakkoudhes in south-west Naxos, an island noted for its marble figurines, amongst many pots of Pelos type, no single object of marble was found. It would seem therefore that the feature has some other explanation than scarcity of marble.

The marble *kandila* is found chiefly in cemeteries such as Plastiras and Glypha in Paros, which have a rather varied repertoire, with both pots and marble vessels, although these are not found together in the same graves. A particular type not found in association with the pottery is the Plastiras figurine (fig. 19.5, 11; pl. 2, 2–3). Until recently it was known only from the publication of Tsountas (1898, pl. 10, 4) but there is an unpublished example in the Ashmolean Museum (AE 417), a specimen from Delos in Berlin (Majewski 1935, pl. xxiii), and others of the type are known (Renfrew 1969a, 6). The discovery by Doumas of three figurines of this type in Grave 9 at Plastiras, together with two *kandiles*, and of another such figurine in Grave 7, transforms the picture. It is clear that we have an important type and the indications are that it may be relatively late.

The evidence for two clumps of material leads one to suggest a Lakkoudhes group and a Plastiras group of the Grotta-Pelos culture. The Lakkoudhes group is characterised by the severe regularity of the incised decoration of the pots—the herring-bone motifs on the pyxides are nearly always horizontal—and by the absence of marble vessels. The Plastiras group is composed chiefly of marble objects, since pots are rarely found. The most frequent of these is the *kandila*, but the flat based rhyton is not rare (fig. 10.5 gives the distribution) and the most striking form is the Plastiras figurine. It seems most probable that the Plastiras group is later than the Lakkoudhes group. The schematic figurines are sometimes found both with pots of the Lakkoudhes group, which certainly long continued in use, and with the marble vessels of the Plastiras group. They may be considered a chronologically intermediate form.

2. The Kampos Group of the Grotta-Pelos Culture and the Cycladic ‘Frying Pans’

The term Kampos group was first used by Fischer-Bossert (1960, 4) for finds from the eponymous cemetery in Paros, known also as Aghios Nikolaos. The term Kampos type will here be used for the ‘frying pan’ found there (Varoucha 1925, 107, fig. 9) and others that are known from Naxos (Kontoleon 1949, 120, fig. 10) and perhaps Syros (Zervos 1957, pls. 224–25). The defining features of this type are a straight side, as opposed to the incurving one of the Syros type, always decorated with an incised line or lines forming running spirals; the handle is rectangular and has a crossbar, and the main surface is never decorated with stamped devices, but always with an incised design of running spirals found usually in a triple line; they run in a circle round a central star motif (pl. 4, 1). It has been possible to study nine fragments of this form from Grotta in Naxos, and in addition to those quoted above, there are two from Naxos now in the National Museum in Athens (6140 Γ and Δ) as well as a fragment from Kato Akrotiri in Amorgos (Tsountas 1898, pl. 9, 16). The example from Louros (Papathanasopoulos 1962, pl. 60) is rather similar. Outside the Cyclades only a single example is known, from Manika in Euboia (pl. 4, 12) although the type does seem to have been imitated in a further example from the tombs on the same site (Papavasileiou 1910, fig. 14) and another from Markopoulos (Theochares 1955a, pl. 1).

The Syros 'frying pan', on the other hand, has an undecorated incurved side and a two-prong handle (pl. 7, 1). It is usually decorated with a network of stamped concentric circles or spirals, which in Syros are often complemented with incised boats (pl. 29, 1; fig. 17.6). The design is surrounded by *Kerbschnitt* zig-zag. Although at least four examples from Syros lack the stamped decoration (Athens NM 5012, 5077, 5153, 5164) they are linked by the other features to this group. Outside Syros it is represented by an example in Mykonos, a sherd from Grotta, and a large fragment in Apeiranthos. From the mainland it is known only by an example from Raphina (Theochares 1951, 88, fig. 14), appropriately from a Korakou culture context.

It is clear that the Kampos type belongs firmly with the Grotta-Pelos culture, while the later Syros type is an integral part of the Keros-Syros culture. Neither is much found on the mainland, where a different type, itself scarcely seen in the Cyclades, was in use (see below). It seems difficult to determine the use of these remarkable vessels, whether trays or even mirrors. Specimens will have to be found in associations more carefully recorded than hitherto, before any firm conclusion can be drawn.

Another form occurring in the Kampos cemetery is the incised bottle (Varoucha 1925, fig. 7) which is known from several other islands, but never in such good associations (pl. 5, 3-5). A suggestion that these finds at Kampos may lie rather late in the time span of the Grotta-Pelos culture is afforded by the marble-footed cup (Varoucha 1925, fig. 6), of a form more often seen in the Keros-Syros culture.

The exceptionally rich grave at Louros in Naxos shows certain similarities with the Kampos finds (Papathanasopoulos 1962, pls. 66-67). Along with two spherical pyxides of the Grotta-Pelos culture were found a 'frying pan' (which may in fact be a pyxis lid) with a flowing decoration of incised spirals. While not identical to those of Kampos type it is similar. Incised spiral decoration is seen again on four tiny jars (Papathanasopoulos 1962, pl. 66). The Louros grave is unusual in containing metal objects—a necklace of silver beads, and three quadrangular awls like those found at Chalandriani in Syros. Finally it contained six arm-stump figurines of marble (pl. 2, 1; Papathanasopoulos 1962, pl. 70) of a form which has been designated the Louros type (Renfrew 1969a, 6). Other examples of this figurine form are known from the Cyclades, but not from well-stratified contexts.

This curious assemblage certainly does not belong to the Keros-Syros culture, despite the copper awls. And it would seem simplest to place it in the Grotta-Pelos culture, alongside the Kampos group.

3. Recurrent Assemblages in the Keros-Syros Culture Cemeteries of Naxos, Keros, Syros and Siphnos

The great cemetery at Chalandriani in Syros was excavated by Tsountas in 1898. In it he found nearly 500 graves, usually constructed of small stones, and each containing a single burial. The graves did not always contain grave goods, but some were extremely rich, and the associations are of great value for proving the contemporaneity of types. For since all the objects in a given grave are the product of a single inhumation, the conclusion seems warranted that associated forms are contemporary. The associations at Syros which can be gleaned from the publication of Tsountas are summarised in table App. 2.1. The painted

wares are seen in pl. 7, 2–5 and fig. 11.1, 9; the stamped forms in pls. 7, 1 and 8, 10–11 and in fig. 11.1, 1 and 10. The spherical pyxis is shown in fig. 11.1, 3 and the 'sauceboat' in pl. 19, 4. The various marble vessels are illustrated in pl. 6 and fig. 11.1, 4 to 8.

One of the first points to strike the eye is the wealth of metal objects (fig. 11.3): 10 tweezers, 16 spatulae and so forth, in a total of only 32 graves listed by Tsountas (although admittedly these are the richest which he excavated). Another feature is the presence of just a few extremely rich graves such as 468 and 469 which unite, in a single burial, many of the principal Syros types. The graves were selected by Tsountas for publication, and the 16 'frying pans', for example, are about half the total found in the entire cemetery. The 6 little conical cups, on the other hand, can represent only about one-twentieth of the total found (cf. pp. 374–75).

These few graves, then, give only a part of the information which the cemetery finds originally contained. In order to test for inherent structure within the grave associations—whether in terms of seriation or of clustering—a similarity matrix was constructed for the 32 graves. As in the analogous case for the Cycladic cemeteries, described in chapter 9, two procedures were adopted.

In the first, punched cards were used to construct the similarity matrix, the similarity between the graves being defined as the number of types common to both graves divided by the total number of types in the poorer of the two graves in question. Close-proximity analysis was then used to look for some patterning in the relations between the graves.

In the second, the Kuzara, Mead and Dixon programme was employed in the manner described in chapter 9 for the Cycladic cemeteries. It produced first a percentile incidence matrix, and then a similarity matrix. This matrix was seriated using their programme, and subjected to close-proximity analysis.

No structure or patterning in the material emerged. There was some clustering around the richer graves, but no overall linear or cluster pattern was obtained. It was concluded that the graves cannot meaningfully be subdivided into groups.

A few minutes' study of Table App. 2.1 shows that all the types are related, by several associations, to the main body of material. The list of types is given in Appendix 3. In particular, the painted wares (Types 30–32) are securely associated in numerous instances with the stamped and incised 'frying pans' (Type 33) or the footed jars (Type 37, 38 unstamped). No distinction of any kind can be made there, and the painted wares must surely be contemporary with the stamp-decorated forms.

The four folded-arm figurines (Type 22) are similarly related to the frying pans, and in one instance to a metal spatula (Type 46). As stressed above, the schematic figurines (Type 18) do not closely resemble those of the Grotta-Pelos culture, and the two examples recorded are securely associated with a footed jar and a cylindrical pyxis respectively. The rich metal finds, and the bone tubes (Type 44) and bird-headed pins (Type 45) are likewise related to the remainder of the material by numerous associations.

Perhaps of some chronological significance in the placing of the Syros graves in relation to other cultures are the spouted bowls of marble (Type 43), the marble footed cups (Type 41) and the bronze pins (Type 47 and 48). All belong firmly with this assemblage. Nor is the obsidian isolated, and its use clearly continues after the introduction of metal.

Certain forms from Chalandriani are not represented in the 32 graves chosen by Tsountas for detailed publication. The only painted form without published associations at Syros is the attractive footed cup (pl. 7, 4; Tsountas 1899, pl. 8, 4) found in Grave 407. A fragment of

TABLE APP. 2.1 Incidence matrix for the recorded graves of the Chalandriani cemetery in Syros. Grave numbers indicated on the left. The number in the matrix indicates the number of occurrences of the type in question in the specified grave. Types as listed for Table App. 3.1.

	9	13	16	18	20	21	22	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52		
157	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0		
166	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0		
172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0		
174	0	1	0	0	0	2	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0		
179	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	
186	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
192	0	3	1	0	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	
205	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	
242	0	0	2	0	0	0	0	1	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	
262	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	2	0	0	0	0	0	1	0	0	0	0	0	1	0	
264	0	0	0	0	0	3	0	0	0	0	2	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	
268	0	1	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
271	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
292	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
307	0	0	1	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4	0	0	3	0	0	0	0	0	0	0	0	0	0
322	2	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	
338	0	0	4	0	0	2	0	1	0	0	0	0	0	0	2	1	0	1	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	
345	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
347	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	
351	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	1	0	1	0	0	0	2	0	0	0	
355	1	0	3	0	0	0	1	0	1	0	0	0	0	1	2	0	0	1	0	0	0	1	0	0	1	1	1	1	0	0	0	0	0	1	0	0
356	1	1	2	0	0	1	0	1	0	1	3	0	0	0	1	1	0	0	0	0	0	1	0	0	0	2	1	1	0	0	0	0	1	2	0	0
359	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	
361	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	3	0	0	0	0	0	0	
371	1	0	2	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
374	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	
408	1	0	2	0	0	0	0	1	1	1	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	
415	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
447	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	
468	0	1	0	1	6	1	0	0	0	12	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	3	1	1	3	2	0	2	0	
469	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	1	2	1	0	0	0	
472	3	0	0	0	0	0	0	4	0	1	0	0	0	0	0	0	0	0	2	1	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	

this type was found in the twelfth half-metre of deposit in Square J 1 at Phylakopi and the form is thus of some chronological importance. It has been compared with cups of metal from Troy II (Schmidt 1902, 5865, without handle). Another important shape for which we have no associations in Syros is the elegant one-handled cup (fig. 20.4, 1; Tsountas 1899, pl. 9, 9 and 11), of which one example comes from Grave 392. Fortunately, however, four of these were found together by Tsountas with one of the painted footed form in Grave 142 in Siphnos. With these were a marble bowl (Type 16) and metal tweezers (Type 26), so that they can well be considered a part of the complex of associations of the culture.

Another important form not well associated is the 'sauceboat'. Although several fine examples were found by Tsountas (pl. 19, 4; Tsountas 1899, pl. 9, 8), the two from Graves 347 and 361, whose associations are given in Table App. 2.1, are flat based and really little more than spouted bowls. So to tie this form in with the complex it is necessary to look to Dhaskalio in Keros or to Spedos in Naxos. The other prominently Early Helladic type (Korakou culture) is the ring-footed saucer, an example of which (fig. 11.1, 2) was found in Grave 374, again in association with other types of the complex.

It is worth specifying also two types not listed in Table App. 2.1 which are of interest because of possible Cretan connections. The little incised steatite vessel (Tsountas 1899, pl. 8, 2) was found in Grave 408 along with a painted high necked jug; and the stamp decorated cylindrical pyxis (Tsountas 1899, pl. 8, 12) is from Grave 264, together with various metal objects and a typical footed cup. In Crete these would find the closest parallels in the Early Minoan II period.

Closer examination of the Syros types, in particular of the decoration of the 'frying pans' and of the footed vessels, might possibly allow of a subdivision into phases of the period represented by these very numerous burials, if further associations were available. But Dr Fischer-Bossert has told me that she can see no evidence which would lead to a subgrouping of the material in this way, and it seems that the Syros graves may best be regarded as a unity.

It is extremely difficult to judge how long these cemeteries were in use. Given a wealthy village settlement of 200 people, where it was the custom to provide each deceased adult with decent burial in his own specially constructed grave, a space of 150 years would be sufficient to account for 500 tombs. This period, however, is clearly a minimum, and could be multiplied several times, with only the homogeneity of the material counselling caution.

In 1963 and again in 1970, when I visited the recently discovered cemetery of Dhaskalio in Keros, the slopes of the hill were littered with a great wealth of sherds. In a couple of hours it was possible to pick up numerous fragments of 'sauceboats', some of them painted, abundant ware of Keros-Syros or Korakou culture type as well as a great variety of obviously local products such as the rather coarse footed jar (cf. Papathanasopoulos 1962, pl. 50, b-c), the domestic counterpart of the footed jars in the Syros graves. Amongst the marble fragments were several pieces of folded-arm figurines and dozens of bowl fragments, mostly with rolled rims. This interesting form is the counterpart in marble of the Grotta-Pelos domestic ware. It is found sometimes in the later graves of that culture, and is one of the elements of continuity between the two cultures. There were several fragments of another marble form, the cylindrical pyxis with horizontal grooves. Examples of this type, reputedly from Syros, are in the British Museum (pl. 6, 3) and the British School (pl. 6, 4) but this is the first time

it has been recovered in the Cyclades in circumstances that can be documented. All these are products of the Keros-Syros culture, and nothing was found that would belong to the Grotta-Pelos culture. However a few spouts, apparently of duck vases were found, and this single feature may indicate some overlap in time with the Phylakopi I period.

In autumn 1963 the cemetery was excavated by Doulas. Amongst the rich finds, which he has kindly permitted me to examine and draw, are stamped and incised sherds of a high footed vessel (Type 37; cf. pl. 8, 10), but no 'frying pan' fragments at all have been recovered. The painted repertoire includes spherical pyxides, high-necked jugs and 'sauceboats' with decoration in thick lines running transversely across the spout comparable to fragments found at Lerna III and Poliochni III. Other decorated fragments resemble the Spedos and Raphina painted 'sauceboats'.

The range in form of the stone vessels from Dhaskalio is truly extraordinary: it goes far beyond the usual Syros repertoire of concave-sided conical cups, often on feet, four-eared dishes and small spouted bowls. There are indeed fragments of several other shapes not recognised elsewhere in the Cyclades. Most striking of all are several fragments of pyxides, chiefly in a fine grey marble, with designs of interlocking spirals carved in relief. This at once calls to mind the similar vessels from Naxos (NM 5358; Zervos 1957, pl. 30), Melos (pl. 15, 1; Zervos 1957, pl. 28) and Amorgos (Dümmeler 1886, pl. 1, 4). Both the pyxis from Maronia in Crete and the Asine pendant (Frödin and Persson 1938, 239 and fig. 173) show similar relief spirals, and although they may well be of local manufacture, they probably fall within the chronological span of the Keros-Syros culture.

The south of Naxos is another region particularly rich at this time. The Spedos cemetery has fortunately been recorded for us, and corroborates and extends the impression given by the Chalandriani graves. Grave 10 (Papathanasopoulos 1962, pls. 46–50) is particularly rich, with two folded-arm figurines, a marble spouted bowl, a painted 'sauceboat' and two painted beaked jugs, as well as a curious painted triple vessel and a strange marble form, both without known parallel (fig. 15.7).

These painted jugs and 'sauceboat' offer a particularly close comparison with objects from the Korakou culture of the mainland, especially such Attic finds as the 'sauceboat' of Raphina (Theochares 1951, figs. 5–7 and 9) and the painted jugs of Askitarion (Theochares 1954a, 67, fig. 16) and also Asine (Frödin and Persson 1938, 229, fig. 167.21). Painted cylindrical pyxides like those of Dhaskalio and Syros (Tsountas 1899, pl. 5, 7 and 8) are likewise found at Raphina (Theochares 1951, 84, fig. 8).

There is also a footed and closed-spouted bowl in Grave 10 at Spedos, which is not unlike the 'sauceboat' in shape. Other unusual 'sauceboat' variants are known in the Cyclades, and one wonders sometimes if they are not as much at home there as on the mainland. The other Spedos finds conform to the Syros range and include a bone tube and three schematic figurines of Syros type. Only the presence of a *kandila* in Grave 12, a Grotta-Pelos form already discussed, is rather surprising.

Other Keros-Syros finds from this area of Naxos but without exact provenance are the 'sauceboat' (fig. 20.4, 5), a painted pyxis lid, a Syros-like footed jar from Kastraki and part of a 'frying pan' (Renfrew 1965, pl. 43, 1). The last of these is one of the few examples found outside Syros itself of a 'frying pan' of Syros type, with elaborate decoration of interlocking stamped spirals. Also from Naxos are the attractive finds from near Aghioi Anargyroi, some of which could be classed in the Amorgos group.

Siphnos also has graves of the Keros-Syros culture (Tsountas 1899, 74) as does Mykonos (Belmont and Renfrew 1964, 397). The rigorous geographical division of the Cyclades into North and South, with the Syros group supposedly restricted to the north, is further belied by the discovery of a jar, clearly of Keros-Syros inspiration, in Melos (pl. 8, 9).

4. The Kastri Group of the Keros-Syros Culture

In 1965 it was possible to draw attention to a number of black burnished vases (Renfrew 1965, 100), mostly excavated by Stephanos at Chalandriani, which are not well tied in with the 32 rich graves at that site, documented in Table App. 2.1. They include a high-necked jug of ovoid form with incised grooves on the sides (pl. 9, 1; Athens NM 4998; Tsountas 1899, pl. 9, 2 from grave 169; Zervos 1957, fig. 195; cf. also Zervos 1957, fig. 196 with elongated oval shape), spouted pots rather resembling Early Minoan II 'teapots' (pl. 9, 2; Tsountas 1899, pl. 9, 14 from grave 392; Zervos 1957, fig. 194; also Athens NM 6140.2 and 3; Zervos 1957, figs. 192–93), a spherical pyxis with incisions (pl. 9, 3; Tsountas 1899, pl. 9, 20, from grave 432) and a very lustrous black, handled cup (pl. 9, 4; Athens NM 5026, Tsountas 1899, pl. 9, 5; Zervos 1957, fig. 184).

The spouted pot occurs with a one-handled cup in Grave 392 (Tsountas 1899, pl. 9, 7 and 14), and examples of this form have been found also on Naxos. The incised pyxis is found both on the Kastri fort and at the Kynthos settlement on Delos.

The publication of the finds from Fischer-Bossert's excavations at the hilltop fort Kastri, at Chalandriani, make it possible to enlarge the repertoire. There, together with the incised pyxis (fig. 11.2,3 ; Bossert 1967, fig. 4.2), a series of two-handled *depas* cups is found, as well as steep-necked jugs, a possibly wheelmade baking plate, and little miniature duck vases (fig. 11.2, 1). Metal objects were also found.

This assemblage, found in the abandoned ruins of the fort, clearly belongs to the last period of occupation of the site. Although only the incised pyxis is seen both in the cemetery and at the Kastri stronghold, comparison with Lefkandi in Euboia and Aghia Irini in Kea allows us to recognise these forms as constituting a single group, which we shall term the Kastri group of the Keros-Syros culture. It clearly belongs to the later part of the duration of the culture, and external comparisons to be outlined below place it in the Aegean Early Bronze 3 period.

On the other hand, the continuity with the preceding phase should not be underestimated. The marble vessels at Kastri (Bossert 1967, fig. 5.3–6) are of the form seen in the cemeteries. And the one-handled cup occurs widely in the Aegean in Early Bronze 2 contexts, being first seen at Eutresis and Lebena in the Early Bronze 1 period. In Grave 142 at Akrotiraki in Siphnos, this form occurs with bronze tweezers and a cup painted in the Keros-Syros style (Type 30 of table App. 2.1). This specific shape cannot be accepted as belonging exclusively to this late Kastri group, although examples with the distinctive and very lustrous black burnish (pl. 9.4; Tsountas 1899, pl. 9, 5; Zervos 1957, fig. 184) may be so restricted.

Recent finds at Aghia Irini in Kea offer striking points of comparison with this material. At Aghia Irini there is a settlement of the Korakou culture, and Caskey (1970) has recognised a specific group of early bronze age material there as belonging to a later phase, still within the span of the early bronze age. The material includes a *depas* cup, a one-handled cup in dark burnished fabric (like that described above) and a bowl of red fabric which

Caskey likens to those of Troy. Howell (1970), as well as Caskey, compares these finds, with their obvious Anatolian affinities, to those of the lowest levels at Lefkandi in Euboia, the Lefkandi I assemblage (cf. chapter 7). French (in Popham and Sackett 1968; French 1968) has indicated the Anatolian resemblances of the Lefkandi finds, which can be equated with the Early Bronze 3 period of the north-west Aegean. And the *depas* cups and jugs at Kastri likewise clearly resemble forms of Troy III and IV.

The *depas* cups of Kastri are of two forms. The first, from Tsountas's excavations (Bossert 1967, fig. 4) is short and squat: the same form is seen in marble at Lerna (Caskey 1964b, fig. 4 and pl. 47, i). The second (fig. 11.2, 4) is tall and elegant and occurs frequently in the Second and Third Cities of Troy.

The jugs are of three forms, of which the first two (fig. 11.2, 6; Bossert 1967, fig. 3.1-2) may be compared with other Cycladic finds as well as with shapes of Troy II and III. The very tall-necked jug (fig. 11.2, 5), however, is an Anatolian form, seen also at Manika in Euboia (Papavasileiou 1910, pl. 9), which is best paralleled in Troy IV (fig. 8.3; Blegen et al. 1951, 110). The affinities of this material are further discussed in the excavator's original publication (Bossert, 1967, 72-73).

The Kastri group of the Keros-Syros culture may thus be set in the Early Bronze 3 period. And the very close similarities with the Trojan materials do suggest direct contact of some kind with the Troad. But the elements of continuity at Chalandriani should not, on the other hand, be overlooked.

5. The Amorgos Group of the Keros-Syros Culture

Some of the graves of Amorgos and also Naxos, while containing various forms characteristic of the Keros-Syros culture, such as the folded-arm figurine, introduce others which have not been found in Syros itself. These forms, prominent among which are the triangular midrib dagger and attractive spoons, handles and beads of green stone, may be considered to define the Amorgos group of the Keros-Syros culture. The daggers and one or two ceramic associations suggest that it extends to the middle bronze age of Crete and of the mainland.

The Ashmolean Museum possesses a duck vase of Phylakopi I type (AE 265; pl. 12, 6) found in a cist grave in Amorgos together with a dagger. Bossert (1953) has published an important dateable grave group from Arkesine with several vases of Phylakopi type in the lower compartment, and an interesting slotted spearhead in the upper one. Elsewhere in the Cyclades, Keros-Syros finds do not occur in this way with those of the Phylakopi I culture, which are generally later.

There is also at this time a characteristic rough-surfaced slightly coarse buff-coloured ware, which occurs in rather baggy shapes (Tsountas 1898, pl. 9, 21 and probably 22). A common form in this buff ware is the open-mouthed jug, often with criss-cross incisions on the handle (cf. pl. 9, 6 and Ashmolean AE 261 from a cist grave in Amorgos). It is markedly less well made than is usual in the early bronze age. Another shape occurring frequently in the Amorgos group is the globular jug with a very short neck (Tsountas 1898, pl. 9, 26). This must be a rather late form, developing out of the earlier globular jugs like those of Spedos (Papathanasopoulos 1962, pls. 51, 58c, 61).

Another feature of the rich Amorgos group is the abundance of finds of silver: pins, bracelets and even a diadem (fig. 18.1). The particularly rich grave at Kapros (Renfrew 1967a; Dümmler 1886, pl. 1) contained silver beads, a silver bowl, decorated 'ivory' and a seal which Frankfort (1939, 232 and 301) relates to the Jemdet Nasr period. This dating has been contested by Kenna (personal communication), but the form is certainly a new one to the Cyclades. A date at the very end of the early bronze age about 2100 BC would seem more appropriate however. Similar cross-stamps are seen on several sherds from Syros and Mykonos, but I do not agree with Bossert (1960, 14) that they are of much chronological significance, for such designs are common enough on seals and sealings elsewhere in the Aegean, notably in Early and Middle Minoan Crete. Silver pins have been found near Aghioi Anargyroi and at Lionas in Naxos, and the little green spoon with silver mountings from the same grave at the former site emphasises its place in the Amorgos group.

The Amorgos group may be viewed as a natural development, chiefly in Amorgos and Naxos, taking place during the later part of the Keros-Syros culture. Clearly it persisted until the beginning of the middle bronze age, but the continuity of its evolution makes close dating difficult except in favourable cases. It is evident that while the Kastri group of the Keros-Syros culture was flourishing in the northern Cyclades, the Amorgos group was at its apogee in the east-central region: they are both products of divergent evolution (together with Anatolian contact in the case of the Kastri group) from a more uniform Keros-Syros culture base. And both overlap in date with the Phylakopi I culture of the southern Cyclades.

6. The Attic-Cycladic *Mischkultur*

The affinities of some of the early bronze age finds of Attica and Euboia with those of the Cyclades have long been recognised. Childe (1957, 51) regarded the Manika tombs as an integral part of his Northern (or 'Syros') Cycladic group, and Mylonas has written of Aghios Kosmas as a Cycladic colony (1959, 162).

Before admitting the similarities which some of the finds from these sites show with Cycladic forms, especially with the Keros-Syros culture, it will be as well to stress the numerous differences which prevent our regarding them either as colonies or a straightforward member of the cultural group. At Manika indeed there are very few finds which can reasonably be regarded as Cycladic imports. Rock-cut tombs of this kind (fig. 7.6, 1-2; Papavasileiou 1910) are not known in the Cyclades, the incised pottery (*ibid.*, pl. 7, 1, 4-6 and pl. 8, 6) is likewise unknown in the islands, although the Kastri finds, like those of Manika, find their closest parallels in Troy III-IV (*cf.* fig. 7.3). Even the folded-arm figurine (*ibid.*, fig. 2) is a little unusual in appearance. These are not Cycladic exports therefore, and the repertoire of forms contains so many non-Cycladic shapes (even the 'frying pans' are different, being mostly undecorated) that the group cannot simply be termed Cycladic.

The same is broadly true for Aghios Kosmas. While some of the figurines could well be Cycladic (Mylonas 1959, fig. 163.2, 4-5) there is little else that has to be. The 'frying pans' are not of the Kampos or Syros types, and indeed constitute the best examples of a new class. It is noticeable too that there is at Aghios Kosmas a mixing of Grotta-Pelos forms (*e.g.* fig. 142.155; fig. 147.191) with others such as 'sauceboats' or the numerous one-handed cups which form part of the Keros-Syros assemblage. This mixing does not occur in the

Cyclades. Moreover a colony might be expected to show far more direct imports, and the argument that it was a Cycladic trading station for the export of obsidian (Mylonas 1959, 163) is not supported by the view that Melian obsidian was never a Cycladic monopoly (Renfrew, Cann and Dixon 1965, 242).

Besides these two sites are several others in Attica and Euboia (fig. 11.5). Often they have cist graves with marble objects amongst the grave goods. Schachermeyr has spoken of the Helladic-Cycladic *Mischkultur*, and while one might hesitate to apply the term too widely, it seems very appropriate to this limited region—Attica and Euboia—where Cycladic finds are so numerous, yet always in a context that is at least as much Early Helladic as Early Cycladic. One imagines considerable Cycladic influence, perhaps through trade, which would account for the Cycladic forms and even burial customs amongst the local Helladic settlements.

Marble figurines of Cycladic type are known from Manika, Styra, Sounion, Piraeus, the Athenian Agora, Markopoulos and Brauron. Marble vessels have been found at Manika, Aghios Kosmas, Porto Rapti and Makronisi (Theochares 1955a). Cist graves are found at most of these sites. In general the finds seem to resemble the Keros-Syros forms rather than the Grotta-Pelos ones. The Pelos type pot in the Benaki Museum (No. 7685, Jacobsen 1969b) must surely be a Cycladic find; indeed it is almost identical in shape and decoration to one found by Bent in Antiparos (Zervos 1957, pl. 62). It seems then that the Cycladic influences which produced the *Mischkultur* were strongest in Keros-Syros times. That they persisted into the Early Bronze 3 period is suggested by the similarity between the Kastri group, the finds of Lefkandi I and of final early bronze age Aghia Irini. But at this time the origin of many forms is to be sought in west Anatolia rather than in the Cyclades.

THE MAINLAND TYPE OF 'FRYING PAN'

It has often been supposed that the sherds decorated with stamped concentric circles, found widely in Early Helladic contexts, are of Cycladic origin. Relatively few of these are from 'frying pans'—frequently the shape is a lid without a handle—and a more careful definition of the Cycladic type shows that the mainland ones fall in a distinct category.

In shape the mainland 'frying pan' is very like the Kampos type with its straight edges and cross-bar handle. The decoration, however, is very different and quite characteristic (fig. 11.6). The edges are always decorated with vertical incised lines or rather jabs (pl. 4, 11, 13 and 14). On the principal circular surface the same motif is seen towards the edge. Generally but not inevitably there is a single ring of stamped circles connected by incised straight lines, and the decorative arrangement has circular symmetry.

Many of the findspots of this type—including some lids—are shown in fig. 11.7. All the finds of 'frying pans' from Aghios Kosmas fall in this category (all probably of Korakou culture date), and so do those from Aegina (pl. 4, 14–15). Only a single such sherd is known from the Cyclades (pl. 4, 11) from Grotta in Naxos. Of great importance is the find of such a fragment at Palaia Kokkinia near Piraeus (Theochares 1951b, 111, fig. 26a) for the prehistoric remains at this site seem to belong exclusively to the Eutresis culture. It occurs too in a similar context at Eutresis (Caskey and Caskey 1960, pl. IV, 4, 14) and elsewhere, so that although it persists into the Korakou culture, it clearly originates in the preceding period.

The very scanty finds of the Cycladic 'frying pans' on the mainland were mentioned above, and to these must be added a stamped footed jar of Syros type found at Askitarion (Theochares 1954a, 75, fig. 26). There are apparently no further finds of Cycladic stamp-decorated sherds

on the mainland. Certainly there is a great quantity of stamped and incised pottery, but it does not compare closely with Cycladic shapes. The same conclusion was reached by Bossert (1960) through a very detailed consideration of the stamped concentric circles themselves. Some other explanation is required than the straightforward import of pottery.

AGHIOS KOSMAS

In order to amplify and corroborate the chronology for the Keros-Syros culture discussed in chapter 13, it is worth looking again at the two chief sites in the area. Aghios Kosmas with its 'sauceboats', askoi, ring-footed bowls and painted ware clearly belongs to the Korakou culture. Mylonas himself spoke of two phases, Early Helladic II and III (1959, 159) but there is none of the painted ware of the Tiryns culture there. This has led Caskey to deny that Aghios Kosmas lasted into the Early Helladic III period (1960a, 300). He is certainly correct in pointing out that the Tiryns culture is not seen at Aghios Kosmas, but whether this rules out contemporaneity with that culture is perhaps less certain.

One of the most noted features of Aghios Kosmas is the practice of cist burial, which is not widely seen on the mainland until Middle Helladic times, and Mylonas is surely right to see in this evidence of Cycladic inspiration. The numerous one-handed cups are common in the Cyclades, as are the little concave-sided pestles (Mylonas 1959, pl. 166, 1–7) which are often made of pretty stones, and are seen at such sites on the mainland as Zygouries (Blegen 1928, pl. xxii, 16–21) and also in Crete. The incised pyxis (Mylonas, pl. 164, 160), however, might more easily be Cretan than Cycladic. Although metal is not common at Aghios Kosmas, the tweezers (op. cit., pl. 163, 13) form a nice link with Manika (Papavasileiou 1910, fig. 4), with Zygouries (Blegen 1928, 183), with Eutresis (Caskey and Caskey 1960, 151) and with Syros (Tsountas 1899, pl. 10, 40–42).

Of great interest are the few finds which suggest Grotta-Pelos influence. It is very difficult to make deductions from figurines, however, unless the parallels are very close. While there is an arm-stump figurine which can safely be compared with the Louros type (Mylonas 1959, pl. 163, 3) the schematic figurine whose head shows facial features (ibid. pl. 163, 1) is not easy to parallel, for those from Drios, in the Paros Museum, similarly with facial features, are of a different shape. Perhaps the pots with vertical suspension lugs (ibid., p. 147, 191 and 201; pls. 142, 169 and 155) most resemble Grotta-Pelos examples, although there is no herringbone incision at Aghios Kosmas, and the ware is rather coarse. In general the Cycladic affinities of Aghios Kosmas relate to the Keros-Syros culture, and support an equation between this and the Korakou culture of the mainland.

MANIKA

There are several interesting features at Manika which, unlike those of Aghios Kosmas, cannot be explained as a simple *Mischung* of Early Helladic and Early Cycladic. Blegen (Blegen et al. 1951, 9) has, however, remarked upon the Anatolian nature of the beaked jugs, three of which (Papavasileiou 1910, pl. 9, lower, 3, 3) he would relate to Troy IV.

The non-Cycladic, and indeed non-mainland look of the incised ware has already been indicated, and two pots from Manika are compared in fig. 7.3 with others from Iasos (Levi 1963a, fig. 97.9 and 5) and Poliochni Yellow (unpublished). The double-line pendant triangle with *pointillé* filling seems a particularly Anatolian motif. Indeed the one-handed cups (Papavasileiou 1910, pl. 8, top) are just as much Anatolian as Cycladic. What is particularly

noticeable about the cemetery is the scarcity of Helladic forms, although these are certainly found in the settlement (Theochares 1959a, 292 f.). Here one really seems justified in seeing very strong west Anatolian influence, and indeed import. The indications are that this would be of Anatolian Early Bronze 3 date (Troy IV) although there is at least one pot, with two handles (Papavasileiou 1910, pl. XI, centre, lower), which look as if it could be of middle bronze age date. In any case, to regard the cemetery as Cycladic is just not justified.

Other tombs, perhaps located elsewhere on the site, have been opened more recently, and the finds there include undoubted Cycladic marble vessels (Theochares 1959a, 305) and a bird-headed pin of bone (*ibid.*, 279). These at least allow us to include Manika in this rather curious *Mischkultur*.

This view, formulated in 1965 (Renfrew 1965, 115), is greatly strengthened by the recognition of the Lefkandi I assemblage. As stated above, the Lefkandi I finds, those of the Manika tombs, the Kastri group in the Cyclades and the recent finds at Aghia Irini in Kea, can all be regarded as related, as showing west Anatolian influence, and in Aegean terms as of Early Bronze 3 date.

Appendix 3

Data for the Matrix Analysis

of the Early Cycladic Cemeteries

The purpose of the matrix analysis was discussed in chapter 10, and the method used was outlined there. To avoid encumbering the text of that chapter with the full data, the matrices themselves are given here, together with a list of the cemeteries considered and of the types which were defined for the analysis.

List of Cemeteries used in the Numerical Analysis

The abbreviations used for the cemeteries (and their number in the Gazetteer list in Appendix 1) are as follows:

AI	: Aïla	: Naxos 25
AK	: Akrotiraki	: Siphnos 3
AN	: Aghios Nikolaos	: Paros 5
AP	: Apollona	: Naxos 6
AV	: Avyssos	: Paros 6
CH	: Chalandriani	: Syros 1
DO	: Dokathismata	: Amorgos 3
GA	: Galana Krimna	: Paros 16
GL	: Glypha	: Paros 17
KA	: Kapros	: Amorgos 7
KE	: Keli	: Naxos 21
KM	: Kamari	: Paros 7
KO	: Kampos tis Makris	: Naxos 33
KP	: Kapsala	: Amorgos 12
KR	: Krassades	: Antiparos 8
KV	: Karvounolakkoi	: Naxos 20
LE	: Leivadhi	: Dhespotikon 2

LO	: Louros	: Naxos 15
MN	: Mnimoria	: Paros 14
PA	: Panaghia	: Paros 15
PE	: Pelos	: Melos 10
PH	: Phyrroghes	: Naxos 16
PO	: Polichni	: Naxos 14
PY	: Pyrgos	: Paros 13
RO	: Roon	: Naxos 19
SP	: Spedos	: Naxos 22
ST	: Stavros	: Amorgos 10
VA	: Vathy	: Siphnos 4
ZO	: Zoumbaria	: Dhespotikon 1

Reference to the original publication of the finds from these cemeteries is given in the Gazetteer. Although this list covers only some of the Early Cycladic cemeteries known, these are the only ones for which detailed data have been published.

List of Artefact Types from the Cycladic Cemeteries used in the Numerical Analysis

Abbreviations: Tc indicates pottery; M, marble; Cu, copper or bronze; In the references, Z refers to Zervos 1956, Pap. to Papathanasopoulos 1961–62, and Tsountas to Tsountas 1898. Other references are to the present work.

Type	Description	Reference
1	Tc Hole-mouthed jar with pierced suspension lugs and incised decoration	Z pls. 61–62; pl. 3, 2
2	Tc Hole-mouthed jar with pierced suspension lugs, undecorated	Z pl. 64, 71; pl. 3, 3
3	Tc Footed jar, similar, incised decoration	Z pl. 73; pl. 3, 1
4	Tc Footed jar, similar, undecorated	Z pl. 66; fig. 10.3, 2
5	Tc Cylindrical pyxis, incised decoration	Z pl. 74, 83; fig. 10.3, 1
6	Tc Cylindrical pyxis, undecorated	Pap. pl. 71
7	Tc Spherical pyxis, incised decoration	Z pls. 81–82; fig. 10.3, 3
8	Tc Spherical pyxis, undecorated	Pap. pl. 67
9	Obsidian (whether blade or core)	Z pl. 32
10	Tc 'Frying pan' of Kampos type	Z pls. 224–27; pl. 4, 1
11	Tc Globular bottle with incised decoration	Z pls. 86–88; pl. 5, 3
12	M Footed cup, convex sided	Z pl. 18; fig. 11.1, 4
13	Stone palette or rectangular stone	Z pl. 15
14	M Footed jar with horizontally pierced lugs (<i>kandila</i>)	Z pls. 6–8; fig. 10.3, 4

- | | | |
|----|--|-------------------------------|
| 15 | M Flat based beaker or rhyton with horizontally pierced lugs | Z pl. 1, 2; fig. 10.4, 3 |
| 16 | M Bowl or saucer of simple profile | Z pl. 4, 5 |
| 17 | M Figurine of Plastiras type | Z pl. 112; pl. 2, 2-3 |
| 18 | M Schematic figurine | Z pls. 57-58; pl. 2, 4-5 |
| 19 | Stone, bird bead | Z pl. 257 |
| 20 | Stone, other beads | Tsountas pl. 8, 20-65 |
| 21 | Stone rubber | Tsountas pl. 8, 12 |
| 22 | M Folded-arm figurine | cf. pls. 30-31 |
| 23 | Cu Dagger or spearhead | pl. 22, 6-10 |
| 24 | Cu Flat axe (or wire) | Pap. pl. 77 |
| 25 | Silver object | Pap. pl. 67 |
| 26 | Cu Tweezers | Z pl. 261; fig. 11.3 |
| 27 | Tc Jug, undecorated | Pap. pl. 51 |
| 28 | Shell or shells | Pap. pl. 52 |
| 29 | Red colouring matter | |
| 30 | Tc Footed cup, convex sided, with painted decoration | Z pls. 240-41; fig. 11.1, 9 |
| 31 | Tc Jug, painted decoration | Z pl. 117; pl. 7, 3 |
| 32 | Tc Pyxis (spherical or cylindrical) painted decoration | Z pls. 233-37; pl. 7, 2 |
| 33 | Tc 'Frying pan' of Syros type | Z pls. 204-5; fig. 11.1, 10 |
| 34 | Tc Footed jar of Syros type, with defined neck, stamped decoration | Z pls. 201, 203; fig. 11.1, 1 |
| 35 | Tc Other vessels with stamped decoration | Z pls. 199-200 |
| 36 | Tc Spherical pyxis of Syros type, undecorated | fig. 11.1, 3 |
| 37 | Tc Footed jar of Syros type, undecorated | pl. 8, 11 |
| 38 | Tc Footed cup, concave sided, undecorated | Z pl. 187 |
| 39 | Tc Footed cup, convex sided, undecorated | Tsountas 1899, pl. 9, 12 |
| 40 | Tc Cup or small bowl, convex sided, undecorated | Tsountas 1899, pl. 9, 26 |
| 41 | M Footed cup, concave sided | Z pl. 49; fig. 11.1, 4 |
| 42 | M Pyxis, spherical or rounded | Z pl. 21 |
| 43 | M Spouted bowl | Z pl. 14; fig. 11.1, 8 |
| 44 | Bone tube with incised decoration | Z pl. 262 |
| 45 | Bone bird-headed pin | Z pl. 256 |
| 46 | Cu Spatula | Z pl. 260; fig. 11.3 |
| 47 | Cu Knot-headed or knob-headed pin | Z pl. 261; fig. 11.3 |
| 48 | Cu Double-spiral-headed pin | Z pl. 261; fig. 11.3 |
| 49 | Cu Awl of rectangular section | Pap. pl. 68 |
| 50 | Cu Needle | Z pl. 261 |
| 51 | Blue colouring matter (azurite) | |
| 52 | Other Bone object | |
| 53 | M Footed jar of Syros type | Z pl. 10 |

TABLE APP. 3.1. Incidence matrix for the occurrence of the different types of grave goods found in the Early Cycladic cemeteries. The first figure indicates the number of different graves in which the type in question is found, the second figure the total number of occurrences of the type in the cemetery in question. The key for the cemetery abbreviations is given on p. 539, and the type numbers at the head of the columns are explained on p. 540.

	N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
AN	5	0	0	0	0	0	0	1/1	0	0	1/1	1/1	1/1	1/2	0	0	0	0	0	0	0	0	0	0	0	0	0
GL	4	0	0	0	0	0	0	0	0	0	0	0	0	0	2/5	0	0	1/1	2/4	0	0	1/1	0	0	0	0	0
GA	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1/6	0	0	0	0	0	0
MN	1	0	0	0	0	0	0	0	0	0	0	0	0	1/1	0	0	0	0	0	0	0	0	0	0	0	0	0
PA	11	2/2	1/1	2/2	1/1	3/4	0	0	0	4/14	0	0	0	1/3	1/1	1/1	0	0	1/1	0	2/5	1/1	0	0	1/1	0	0
PY	14	3/3	0	0	0	6/7	1/1	3/3	0	0	0	0	0	1/1	1/1	0	1/1	0	3/18	0	6/28	1/2	0	0	0	0	0
AV	2	0	0	0	0	2/2	0	0	0	0	0	0	0	0	0	0	1/1	0	0	0	1/3	0	0	0	0	0	0
KM	1	0	0	0	0	1/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KR	10	1/1	2/2	2/2	0	0	0	0	0	1/1	0	0	0	1/2	1/1	1/1	2/2	1/1	3/16	0	4/21	1/1	0	0	0	0	0
LE	17	0	0	0	0	0	0	2/2	2/3	8/17	1/1	1/1	0	0	0	1/1	2/2	1/1	2/5	0	0	1/2	0	0	1/1	0	0
ZO	5	2/2	2/2	0	0	1/1	0	0	0	0	0	0	0	0	0	0	0	1/1	2/7	1/1	2/51	0	0	0	0	0	0
KP	4	0	0	0	0	0	0	0	0	2/7	0	0	0	0	0	0	0	0	0	0	0	0	1/1	1/1	0	0	1/1
ST	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1/2	0	0	0
DO	3	0	0	0	0	0	0	0	0	1/1	0	0	0	0	0	0	2/3	0	0	0	0	0	2/3	1/2	0	2/4	0
KA	2	0	0	0	0	0	0	0	0	1/1	0	0	0	0	0	0	0	1/1	0	0	1/1	0	0	0	1/1	0	0
CH	32	0	0	0	0	0	0	0	0	9/12	0	0	0	9/12	0	0	12/23	0	2/2	0	1/6	10/16	3/4	0	0	0	7/10
KV	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1/2	0	2/2	0	0	0	0	0	1/1	0	0	0	0
KE	3	0	0	0	0	1/1	1/1	0	1/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SP	13	0	0	0	0	0	0	1/1	0	3/3	0	0	0	0	1/1	0	5/9	0	1/3	0	0	0	4/5	0	0	0	0
AI	3	0	0	0	0	1/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LO	1	0	0	0	0	0	0	0	1/2	1/16	1/1	0	0	0	0	0	1/2	0	0	0	1/4	0	0	0	0	1/1	0
PH	2	0	0	0	0	0	1/1	0	0	0	0	0	0	0	0	0	0	0	0	0	1/28	0	1/1	0	0	0	0
PO	2	0	0	0	0	0	0	1/1	0	0	0	0	0	0	0	0	1/1	0	0	0	0	0	0	0	0	0	0
KO	6	0	0	0	0	5/7	2/2	0	0	1/1	0	0	0	0	0	0	0	0	2/2	0	0	0	0	0	0	0	0
AP	2	0	0	0	0	0	0	0	0	0	0	0	0	1/1	1/1	0	0	0	0	0	2/4	1/1	0	1/1	0	0	0
RO	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1/1	0	0	0	0
PE	6	3/3	0	0	0	0	0	1/1	2/2	2/4	0	0	0	0	0	0	0	0	0	0	1/1	0	0	0	0	0	0
AK	9	0	0	0	0	1/1	0	2/2	0	2/4	0	0	0	1/1	0	0	2/3	0	2/2	1/3	1/1	0	0	0	0	0	1/1
VA	4	0	0	0	1/1	2/3	0	1/1	0	0	0	0	0	0	0	0	0	0	0	0	1/10	0	0	0	0	0	0

	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
AN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PA	0	2/2	1/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PY	0	1/34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KR	0	0	0	0	0	0	0	1/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LE	0	0	1/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ZO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KP	0	1/2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1/1	0	0	0	0	0	0
ST	1/1	0	0	0	0	0	0	0	0	0	0	0	0	1/1	0	0	0	0	0	0	0	0	0	0	0	0	0
DO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CH	4/4	12/24	2/5	3/3	2/2	3/3	14/16	9/10	2/2	6/6	5/6	5/5	5/6	10/13	6/9	2/2	4/4	10/14	3/3	15/18	3/5	2/2	4/7	5/7	4/4	3/5	0
KV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1/1	0	0	0	0	0	0	0	0	0	0	1/1
KE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SP	4/4	1/1	0	0	2/3	0	0	1/2	0	0	0	0	0	0	0	0	2/2	1/1	0	1/1	0	0	0	0	0	0	0
AI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1/3	0	0	0	0
PH	0	0	0	0	1/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AK	0	1/1	1/1	0	0	0	1/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: It was possible to include only such data as were published by the excavator. Sources: Tsountas 1898, Tsountas 1899; Varoucha 1926 ; Papathanasopoulos 1961–62; Edgar 1897.

TABLE APP. 3.2 Unordered presence-absence similarity coefficient matrix for the Early Cycladic cemeteries. The figure indicates in each case the number of types the two cemeteries have in common, irrespective of the number of times these occur in each cemetery. Cemeteries as listed for Table App. 3.1.

	AN	GL	GA	MN	PA	PY	AV	KM	KR	LE	ZO	KP	ST	DO	KA	CH	KV	KE	SP	AI	LO	PH	PO	KO	AP	RO	PE	AK	VA
AN	—	0	1	1	3	2	1	0	2	5	0	0	0	0	0	1	0	0	1	0	1	1	1	0		0	2	4	1
GL	0	—	0	0	3	3	0	0	4	2	1	0	0	0	0	2	1	0	2	0	0	0	0	1	2	0	0	1	0
GA	1	0	—	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
MN	1	0	0	—	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PA	3	3	1	0	—	6	3	1	9	7	4	1	0	0	1	5	1	1	3	1	0	0	0	2	3	0	2	7	2
PY	2	3	0	0	6	—	2	1	5	2	3	1	0	1	0	4	2	2	4	1	1	1	1	3	2	0	1	5	1
AV	1	0	0	0	3	2	—	1	1	1	1	0	0	1	0	1	1	1	1	1	1	0	1	1	0	0	0	2	1
KM	0	0	0	0	1	1	1	—	0	0	1	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	1	1
KR	2	4	0	0	9	5	1	0	—	5	3	0	0	1	0	5	2	0	4	0	1	0	1	1	3	0	2	6	0
LE	5	2	1	0	7	2	1	0	5	—	1	0	0	1	1	4	1	1	3	0	3	1	2	1	1	0	3	5	1
ZO	0	1	0	0	4	3	1	1	3	1	—	0	0	0	0	1	0	1	1	1	0	0	0	2	0	0	1	3	1
KP	0	0	0	0	1	1	0	0	0	0	0	—	1	2	0	4	1	0	2	0	0	0	0	0	1	1	0	2	0
ST	0	0	0	0	0	0	0	0	0	0	0	1	—	1	0	2	0	0	1	0	0	0	0	0	1	0	0	0	0
DO	0	0	0	0	0	1	1	0	1	1	0	2	1	—	0	2	2	0	2	0	2	0	1	0	1	1	0	2	0
KA	0	0	0	0	1	0	0	0	0	1	0	0	0	0	—	1	0	0	0	0	0	0	0	0	0	0	0	0	0
CH	1	2	0	0	5	4	1	0	5	4	1	4	2	2	1	—	3	0	10	0	2	1	1	1	2	1	0	8	0
KV	0	1	0	0	1	2	1	0	2	1	0	1	0	2	0	3	—	0	2	0	0	0	0	0	1	1	0	0	0
KE	0	0	0	0	1	2	1	1	0	1	1	0	0	0	0	0	0	—	0	1	1	1	0	2	0	0	1	1	1
SP	1	2	0	0	3	4	1	0	4	3	1	2	1	2	0	10	2	0	—	0	1	1	2	1	1	1	1	4	1
AI	0	0	0	0	1	1	1	1	0	0	1	0	0	0	0	0	0	1	0	—	0	0	0	1	0	0	0	1	1
LO	1	0	0	0	0	1	1	0	1	3	0	0	0	2	0	2	0	1	1	0	—	1	1	0	0	0	1	1	0
PH	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	1	1	0	1	—	0	1	0	0	0	0	0
PO	1	0	0	0	0	1	1	0	1	2	0	0	0	1	0	1	0	2	0	1	0	—	0	0	0	1	2	1	
KO	0	1	0	0	2	3	1	1	1	1	2	0	0	0	0	1	0	2	1	1	0	1	0	—	0	0	0	2	1
AP	1	2	0	0	3	2	0	0	3	1	0	1	1	1	0	2	1	0	1	0	0	0	0	0	—	0	0	1	0
RO	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	1	0	0	0	0	0	0	—	0	0	0
PE	2	0	1	0	2	1	0	0	2	3	1	0	0	0	0	0	0	1	1	0	1	0	1	0	0	0	—	3	1
AK	4	1	1	0	7	5	2	1	6	5	3	2	0	2	0	8	0	1	4	1	1	0	2	2	1	0	3	—	2
VA	1	0	0	0	2	1	1	1	0	1	1	0	0	0	0	0	0	1	1	1	0	0	1	1	0	0	1	2	—

TABLE APP. 3.3 Percentile similarity coefficient matrix for the Early Cycladic cemeteries, as ordered by the computer, using the Kuzara-Mead-Dixon program for Robinson-Brainerd seriation. Cemeteries as listed for Table App. 3.3.

	MN	AN	KE	AI	KM	KO	AV	VA	PY	ZO	KR	PA	AK	LE	LO	PE	KA	PH	GA	AP	GL	CH	KP	SP	DO	KV	PO	RO	ST
MN	200	40	0	0	0	0	0	0	7	0	10	8	13	0	0	0	0	0	0	33	0	9	0	0	0	0	0	0	0
AN	40	200	0	0	0	0	0	40	30	0	10	8	38	35	29	22	0	40	0	33	0	9	0	7	0	0	40	0	0
KE	0	0	200	67	67	107	67	67	52	18	0	25	12	17	29	44	0	50	0	0	0	0	0	0	0	0	0	0	0
AI	0	0	67	200	200	100	100	80	44	18	0	25	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KM	0	0	67	200	200	100	100	80	44	18	0	25	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KO	0	0	107	100	100	200	100	80	74	55	38	53	58	37	20	20	20	40	0	0	40	11	20	27	20	0	0	0	0
AV	0	0	67	100	100	100	200	120	96	55	57	42	50	17	57	22	50	50	50	50	0	13	0	37	50	50	50	0	0
VA	0	40	67	80	80	80	120	200	107	55	38	50	50	17	29	44	40	40	40	40	0	1	0	7	0	0	40	0	0
PY	7	30	52	44	44	74	96	107	200	99	99	96	92	50	36	67	44	52	44	67	37	33	7	37	7	15	30	0	0
ZO	0	0	18	18	18	55	55	55	99	200	103	68	63	26	29	59	55	36	36	36	55	3	0	7	0	0	0	0	0
KR	10	10	0	0	0	38	57	38	99	103	200	102	76	70	57	41	57	38	38	67	57	52	10	51	29	29	19	0	0
PA	8	8	25	25	25	53	42	50	96	68	102	200	87	75	45	67	58	17	17	42	25	43	50	44	25	8	0	0	0
AK	13	38	12	13	13	58	50	50	92	63	76	87	200	86	62	60	38	13	13	25	25	68	50	69	50	25	50	0	0
LE	0	35	17	0	0	37	17	17	50	26	70	75	86	200	72	79	67	9	0	9	35	34	57	54	42	17	35	0	0
LO	0	29	29	0	0	20	57	29	36	29	57	45	62	72	200	79	57	57	29	29	0	27	29	51	82	29	29	0	0
PE	0	22	44	0	0	20	22	44	67	59	41	67	60	79	79	200	67	22	22	22	0	10	44	30	25	0	22	0	0
KA	0	0	0	0	0	20	50	40	44	55	57	58	38	67	57	67	200	50	50	50	33	10	50	22	25	0	0	0	0
PH	0	40	50	0	0	40	50	40	52	36	38	17	13	0	29	22	50	200	50	50	0	3	0	15	0	0	0	0	0
GA	0	0	0	0	0	0	50	40	44	36	38	17	13	0	29	22	50	50	200	67	0	1	0	0	0	0	0	0	0
AP	33	33	0	0	0	0	50	40	67	36	67	42	25	9	29	22	50	50	67	200	67	20	29	7	25	33	0	0	33
GL	0	0	0	0	0	40	0	0	37	55	57	25	25	35	0	0	33	0	0	67	200	12	0	15	0	33	0	0	0
CH	9	9	0	0	0	11	13	1	33	3	52	43	68	34	27	10	10	3	1	20	12	200	35	66	24	17	12	3	14
KP	0	0	0	0	0	20	0	0	7	0	10	50	50	57	29	44	50	0	0	29	0	35	200	58	79	29	0	29	29
SP	0	7	0	0	0	27	37	7	37	7	51	44	69	54	51	30	22	15	0	7	15	66	58	200	89	74	44	30	30
DO	0	0	0	0	0	20	50	0	7	0	29	25	50	42	82	25	25	0	0	25	0	24	79	89	200	83	50	50	25
KV	0	0	0	0	0	0	50	0	15	0	29	8	25	17	29	0	0	0	0	33	33	17	29	74	83	200	67	33	0
PO	0	40	0	0	0	0	50	40	30	0	19	0	50	35	29	22	0	0	0	0	0	12	0	44	50	67	200	0	0
RO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	29	30	50	33	0	200	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	0	14	29	30	25	0	0	0	200

TABLE APP. 3.4 Percentile incidence matrix for the Early Cycladic cemeteries, ordered by the computer in the ordering presented in Table App. 3.3. The percentage in each case indicates the contribution made by the type in question to the total for the cemetery. (The total occurrence of type, and not simply their presence as in Table App. 3.2, is taken into account.) Early types are on the left. Cemeteries and types as listed for Table App. 3.1.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
MN	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0
AN	0	0	0	0	0	0	20	0	0	20	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KE	0	0	0	0	33	33	0	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AI	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KM	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KO	0	0	0	0	50	20	0	0	10	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0
AV	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	25	0	0	0	25	0	0	0	0	0	0
VA	0	0	0	20	40	0	20	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0
PY	11	0	0	0	22	4	11	0	0	0	0	0	4	4	0	4	0	11	0	22	4	0	0	0	0	0
ZO	18	18	0	0	9	0	0	0	0	0	0	0	0	0	0	0	9	18	9	18	0	0	0	0	0	0
KR	5	10	10	0	0	0	0	0	5	0	0	0	5	5	5	10	5	14	0	19	5	0	0	0	0	0
PA	8	4	8	4	12	0	0	0	17	0	0	0	4	4	4	0	0	4	0	8	4	0	0	4	0	0
AK	0	0	0	0	6	0	13	0	13	0	0	0	6	0	0	13	0	13	6	6	0	0	0	0	0	6
LE	0	0	0	0	0	0	9	9	35	4	4	0	0	0	4	9	4	9	0	4	0	0	4	0	0	0
LO	0	0	0	0	0	0	0	14	14	14	0	0	0	0	0	14	0	0	0	14	0	0	0	0	14	0
PE	33	0	0	0	0	0	11	22	22	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0
KA	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	25	0	0	25	0	0	0	25	0	0
PH	0	0	0	0	0	25	0	0	0	25	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0
GA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0
AP	0	0	0	0	0	0	0	0	0	0	0	0	17	17	0	0	0	0	33	17	0	17	0	0	0	0
GL	0	0	0	0	0	0	0	0	0	0	0	0	0	33	0	0	17	33	0	0	17	0	0	0	0	0
CH	0	0	0	0	0	0	0	0	5	0	0	0	5	0	0	6	0	1	0	1	5	2	0	0	0	4
KP	0	0	0	0	0	0	0	0	29	0	0	0	0	0	0	0	0	0	0	0	0	14	14	0	0	14
SP	0	0	0	0	0	0	4	0	11	0	0	0	0	4	0	19	0	4	0	0	0	15	0	0	0	0
DO	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	25	0	0	0	0	25	13	0	25	0	0
KV	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	33	0	0	0	0	0	17	0	0	0	0
PO	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0
RO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0
ST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	0	0	0	0

	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
MN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PY	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ZO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PA	0	8	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AK	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LE	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0
PE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PH	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CH	2	6	1	2	1	2	7	5	1	3	3	3	3	5	3	1	2	5	2	8	2	1	2	3	2	2	0
KP	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0
SP	15	4	0	0	7	0	0	4	0	0	0	0	0	0	0	0	7	4	0	4	0	0	0	0	0	0	0
DO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	17
PO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ST	33	0	0	0	0	0	0	0	0	0	0	0	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bibliography

- ÅBERG, N.
 - 1932 *Bronzezeitliche und früheisenzeitliche Chronologie*, III.
 - 1933 *Bronzezeitliche und früheisenzeitliche Chronologie*, IV.
- ÅLIN, P.
 - 1962 *Das Ende der Mykenischen Fundstätten auf dem griechischen Festland* (Studies in Mediterranean Archaeology I).
- ÅSTRÖM, P.
 - 1963 Remarks on Middle Minoan chronology, *Kretika Chronika* 16, 137.
- ADAMS, R. M.
 - 1960 Early civilisation, subsistence and environment, in Kraeling, C. H. And Adams, R. M. (eds.), *City Invincible, an Oriental Institute Symposium*.
 - 1965 *Land Behind Baghdad*.
 - 1966 *The Evolution of Urban Society*.
- AKURGAL, E. AND HIRMER, M.
 - 1962 *The Art of the Hittites*.
- ALBRIGHT, F.
 - 1954 A survey of the archaeological chronology of Palestine from Neolithic to Middle Bronze, in Ehrich, R. W. (ed.), *Relative Chronologies in Old World Archaeology*, 26.
- ALEXIOU, S.
 - 1951 Protominoikoi taphoi para to Kanli Kastelli, *Kretika Chronika* 1951, 275.
 - 1958 Ein frühminoisches Grab bei Lebena auf Kreta, *Archäologischer Anzeiger* 1958, 1.
- 1960 New light on Early Minoan dating, *Illustrated London News*, August 6, 1960.
 - 1963 Oi Protominoikoi taphoi tis Lebenos kai i Exelixis ton Protominoikon Rhythmon, *Kretika Chronika* 17, 88.
- ALLBAUGH, L. G.
 - 1953 *Crete, a Case Study of an Underdeveloped Area*.
- ALMAGRO, M.
 - 1940 El hallazgo de la Ría de Huelva y el final de la Edad del Bronce en el Occidente de Europa, *Ampurias* 2, 117.
- ANDERSON, W. F.
 - 1962 Arithmetical procedure in Minoan Linear A and Minoan-Greek Linear B, *American Journal of Archaeology* 62, 363.
- ANDREOU, S., FOTIADIS, M.
 - AND KOTSAKIS, K.
 - 1996 Review of Aegean Prehistory V: The Neolithic and Bronze Age of Northern Greece, *American Journal of Archaeology* 100, 537-97.
- ANGEL, J. L.
 - 1966 Porotic hyperostosis, anaemias, malaras and marshes in the prehistoric Eastern Mediterranean, *Science* 153, 760.
- ANGELOPOULOU, A.
 - 2006 The Lead Seal and the Clay Sealings, in L. Marangou et al. (eds.), *Markiani, Amorgos: An Early Bronze Age Fortified Settlement* (BSA Supplementary Volume 10), London, British School at Athens, 219-22.

- 2008 The 'Kastri Group': Evidence from Korfari ton Amagydalion (Panormos), Naxos, Dhaskalio Kavos and Akrotiri Thera, in N. Brodie et al. (eds.), *Horizon: A Colloquium on the Prehistory of the Cyclades*, Cambridge, McDonald Institute, 149–64.
- ARUZ, J.
1999 The Oriental Impact on the Forms of Early Aegean Seals, in P. Betancourt, V. Karageorghis, R. Laffineur and W.-D. Niemeier (eds.), *Meletemata, Studies in Aegean Archaeology Presented to Malcolm H. Wiener (Aegaeum 20)*, Liège, Université de Liège, 7–14.
- ASHBY, W. R.
1952 *Design for a Brain*.
1956 *An Introduction to Cybernetics*.
- ATKINSON, T. D., CROWFOOT, J. W., EDGAR, C. C., BOSANQUET, R. C., MACKENZIE, D., AND SMITH, G.
1904 *Excavations at Phylakopi in Melos* (Journal of Hellenic Studies Supplement 4).
- BAKALAKIS, G.
1964 Notes Cycladiques, *Bulletin de Correspondance Hellénique* 88, 555.
1969 Aus den Grotten von Antiparos und Paros, *Archäologischer Anzeiger* 1969, 126.
- BARBER, E. J. W.
1991 *Prehistoric Textiles: the Development of Cloth in the Neolithic and Bronze Ages with Special Reference to the Aegean*, Princeton, Princeton University Press.
- BARBER, R. L. N.
1987 *The Cyclades in the Bronze Age*, London, Duckworth.
- BARBER, R. L. N. AND MACGILLIVRAY, J. A.
1980 The Early Cycladic Period: Matters of Definition and Terminology, *American Journal of Archaeology* 84, 141–57.
- BARDANIS, M.
1966 Stoicheia apo tis astronomikes gnoseis ton proistorikon Kykladiton, *Deltion tis Bibliothikis Nikou N. Glezou* 2, 71.
- BARRETT, J. C. AND HALSTEAD, P. (EDS.)
2004 *The Emergence of Civilisation Revisited*, (Sheffield Studies in Aegean Archaeology 6), Oxford, Oxbow Books.
- BASS, G. F.
1966 Troy and Ur: gold links between two ancient capitals, *Expedition* 8, 26.
1967 Cape Gelidonya, a Bronze Age shipwreck, *Transactions of the American Philosophical Society* 57, Part 8.
- BASSIAKOS, Y. AND PHILANIOTOU, O.
2007 Early Copper Production on Kythnos, in P. M. Day and R. C. P. Doonan (eds.), *Metallurgy in the Early Bronze Age Aegean* (Sheffield Studies in Aegean Archaeology 7), Oxford, Oxbow Books, 19–56.
- BEATTIE, A. J.
1958 The 'Spice' tablets of Cnossos, Pylas and Mycenae, in Grumach, E. (ed.), *Minoica – Festschrift zum 80. Geburtstag von Johannes Sundwall*, 6.
- BECK, C. E., WILBUR, E., MERET, S., KOSSOVA, M. AND KERMANI, K.
1965 The infrared spectra of amber and the identification of Baltic amber, *Archaeometry* 8, 96.
- BECK, H. C.
1928 Early magnifying glasses, *Antiquaries' Journal* 8, 327.
- BEER, S.
1959 *Cybernetics and Management*.
- BELL, J. A.
1994 *Reconstructing Prehistory, Scientific Method in Archaeology*, Philadelphia, Temple University Press.
- BELLWOOD, P. AND RENFREW, C. (EDS.)
2002 *Examining the Farming/Language*

- Dispersal Hypothesis*, Cambridge, McDonald Institute.
- BELMONT, J. S. AND RENFREW, C.
1964 Two prehistoric sites on Mykonos, *American Journal of Archaeology* 68, 395.
- BELOCH, K. J.
1880 *Die Bevölkerung der Griechisch-Römischen Welt* (Historische Beiträge zur Bevölkerungslehre, vol. I).
- BENDALL, L. M.
2007 *Economics of Religion in the Mycenaean World*, Oxford, Oxford University School of Archaeology
- BENNET, J. AND GALATY, M.
1997 Ancient Greece: Recent Developments in Aegean Archaeology and Regional Studies, *Journal of Archaeological Research* 5, 75–120.
- BENNETT, E. L.
1950 Fractional quantities in Minoan book-keeping, *American Journal of Archaeology* 54, 202.
- BENOIT, F.
1956 La constitution du Musée Borely et les fraudes archéologiques des fouilles de Marseille, *Provence Historique* 6, 1.
- BENT, J. T.
1884 Researches among the Cyclades, *Journal of Hellenic Studies* 5, 53.
1885 *The Cyclades*.
1888 Discoveries in Asia Minor, *Journal of Hellenic Studies* 9, 82.
- BENTON, J. F.
1968 *Town Origins*.
- BENTON, S.
1947 Hagios Nikolaos near Astakos in Akarnania, *Annual of the British School of Archaeology at Athens* 42, 156.
1964 No tin at Kirrha in Phokis, *Antiquity* 38, 138.
- BERCIU, D.
1961 *Contribuții la Problemele Neoliticului în România în Lumina Noilor Cercetări*.
- BERGER, R. AND LIBBY, W. F.
1967 U.C.L.A. Radiocarbon dates 6, *Radiocarbon* 9, 490.
- BERNAL, M.
1987 *Black Athena: The Afroasiatic Roots of Classical Civilization* I, London, Free Association Books.
- BERTALANFFY, L. VON
1950 An outline of general system theory, *British Journal of the Philosophy of Science* 1, 134.
- BETANCOURT, P.
2008 The Cemetery at Haghia Photia, Crete, in N. Brodie et al. (eds.), *Horizon: A Colloquium on the Prehistory of the Cyclades*, Cambridge, McDonald Institute, 237–40.
- BETTS, J. H.
1967 New Light on Minoan bureaucracy, *Kadmos* 6, 15.
- BEVAN, A.
2004 Emerging Civilized Values? The Consumption and Imitation of Stone Vessels in EMII–MMI Crete and its wider Eastern Mediterranean Context, in J. C. Barrett and P. Halstead (eds.), *The Emergence of Civilisation Revisited*, (Sheffield Studies in Aegean Archaeology 6), Oxford, Oxbow Books, 107–26.
- BIESANTZ, H.
1959 Bericht über die Ausgrabungen in Thessalien 1958: II. Die Ausgrabung bei der Soufli-Magula, *Archäologischer Anzeiger* 1959, 56.
- BINFORD, L. R.
1962 Archaeology as Anthropology, *American Antiquity* 28, 217.

- 1965 Archaeological systematics and the study of culture process, *American Antiquity* 31, 203.
- 1968a Archaeological perspectives, in Binford, S. R. and Binford, L. R. (eds.), *New Perspectives in Archaeology*, 5.
- 1968b Post-pleistocene adaptations, in Binford, S. R. and Binford, L. R. (eds.), *New Perspectives in Archaeology*, 313.
- 1968c Some comments on historical versus processual archaeology, *South Western Journal of Anthropology* 24 no. 3, 267.
- BITTEL, K.
- 1934 *Prähistorische Forschungen in Kleinasien*.
- 1942 *Kleinasiatische Studien, Istanbul Mitteilungen* 5.
- 1959 Beiträge zur Kenntnis anatolischer Metallgefäße der zweiten Hälfte des dritten Jahrtausends, *Jahrbuch des Deutschen Archäologischen Instituts* 74.
- BLANCE, B.
- 1961 Early Bronze Age colonists in Iberia, *Antiquity* 35, 192.
- BLEGEN, C. W.
- 1921 *Korakou, a Prehistoric Settlement near Corinth*.
- 1927 Excavations at Nemea 1926, *American Journal of Archaeology* 31, 421.
- 1928 *Zygouries, a Prehistoric Settlement in the Valley of Cleonae*.
- 1930 *Gonia, Metropolitan Museum Studies* 3, 55.
- 1937 *Prosymna: The Helladic Settlement preceding the Argive Heraeum*.
- 1961 *Troy, Cambridge Ancient History* I, Ch. 18.
- 1963 *Troy and the Trojans*.
- BLEGEN, C. W., CASKEY, J. L., RAWSON, M. AND SPERLING, J.
- 1950 *Troy. I. General Introduction. The First and Second Settlements*.
- BLEGEN, C. W., CASKEY, J. L. AND RAWSON, M.
- 1951 *Troy, the Third, Fourth and Fifth Settlements*.
- BLEGEN, C. W. AND RAWSON, M.
- 1966 *The Palace of Nestor I*.
- BLINKENBERG, C.
- 1896 *Praemykeniske Oldsager, Aarbeger for Nordsk Oldkynsdighed og Historie* 11, 1.
- BOESSNECK, J.
- 1956 Zu den Tierknochen aus neolitischen Siedlungen Thessaliens, *Berichte der Römisch-Germanischen Kommission* 36, 1.
- BOGNÁR-KUTZIÁN, I.
- 1965 *The Copper Age cemetery of Tiszapolgár-Basatanya*.
- BOSANQUET, R. C.
- 1896 Prehistoric Graves in Syra, *Annual of the British School of Archaeology at Athens* 2, 141.
- 1897a Notes from the Cyclades, *Annual of the British School of Archaeology at Athens* 3, 52.
- 1897b Excavations of the British School at Melos, *Journal of Hellenic Studies* 17, 122.
- 1902 Excavations at Palaikastro I, *Annual of the British School of Archaeology at Athens* 8, 290.
- BOSANQUET, R. C. AND DAWKINS, R. M.
- 1923 *The Unpublished Objects from the Palaikastro Excavations*.
- BOSERUP, E.
- 1965 *The Conditions of Agricultural Growth*.
- BOSSERT, E. M.
- 1954 Zur Datierung der Gräber von Arkesine auf Amorgos, *Festschrift für Peter Goessler* (Tübinger Beiträge zur Vor- und Frühgeschichte), 23.
- 1960 Die gestempelten Verzierungen auf frühbronzezeitlichen Gefäßen der Ägäis, *Jahrbuch des Deutschen Archäologischen Instituts* 75, 1.

- 1965 Ein Beitrag zu den frühkykladischen Fundgruppen, *Anadolu Araştırmaları* 2, 85.
- 1967 Kastri auf Syros, *Archaiologikon Deltion* 22, 53.
- BOSSERT, E. M. AND ERHARDT, S.
- 1965 Zwei frühbronzezeitliche Gräber von Zoumbari auf Despotikon (Kykladen), *Fundberichte aus Schwaben* 17, 112.
- BOSSERT, H. TH.
- 1937 *The Art of Ancient Crete*.
- BOTHMER, D. VON
- 1961 *Ancient Art from New York Private Collections*.
- BOTTEMA, S.
- 1967 A late Quaternary pollen diagram from Ioannina, north-western Greece, *Proceedings of the Prehistoric Society* 26, 33.
- BOYD HAWES, H.
- 1908 *Gournia*.
- BRAIDWOOD, R. J. AND HOWE, B.
- 1960 *Prehistoric Investigations in Iraqi Kurdistan* (Studies in Ancient Oriental Civilisation 31).
- BRAINERD, G. W. AND ROBINSON, W. S.
- 1951 A method for chronologically ordering archaeological deposits, *American Antiquity* 16, 293.
- BRAITHWAITE, R. B.
- 1953 *Scientific Explanation*.
- BRANIGAN, K.
- 1965a A note on the chronology of the Diana Culture, *Bullettino di Paletnologia Italiana* 16, 47.
- 1965b The origin of the hieroglyphic sign 18, *Kadmos* 1, 79.
- 1966a Byblite daggers in Cyprus and Crete, *American Journal of Archaeology* 70, 123.
- 1966b Prehistoric relations between Italy and the Aegean, *Bullettino di Paletnologia Italiana* 17, 97.
- 1967a The Early Bronze Age daggers of Crete, *Annual of the British School of Archaeology at Athens* 62, 211.
- 1967b Further light on prehistoric relations between Crete and Syria, *American Journal of Archaeology* 71, 117.
- 1968a *Copper and Bronze Working in Early Bronze Age Crete* (Studies in Mediterranean Archaeology 19).
- 1968b Silver and lead in prepalatial Crete, *American Journal of Archaeology* 72, 219–29.
- 1968c The Mesara tholoi and Middle Minoan chronology, *Studi Micenei ed Egeo-Anatolici* 5, 12.
- 1968d A transitional phase in Minoan metalurgy, *Annual of the British School of Archaeology at Athens* 63, 185.
- 1969a The earliest Aegean scripts, the prepalatial background, *Kadmos* 8, 1.
- 1969b The genesis of the Household Goddess, *Studi Micenei ed Egeo-Anatolici* 8, 28.
- 1969c Early Aegean hoards of metalwork, *Annual of the British School of Archaeology at Athens* 64, 1.
- 1970a *The Foundations of Palatial Crete*.
- 1970b *The Tombs of Mesara*.
- 1974 *Aegean Metalwork of the Early and Middle Bronze Age*, Oxford, Clarendon Press.
- BRAUDEL, F.
- 1972 *The Mediterranean and the Mediterranean World in the Age of Philip II*, London, Collins.
- BRAY, W.
- 1963 The Ozieri culture of Sardinia, *Rivista di Scienze Preistoriche* 18, 155.
- BREA, L. B.
- 1955 A Bronze Age house at Poliochni, *Proceedings of the Prehistoric Society* 21, 145.
- 1957 Recenti scavi a Poliochni nell'isola di Lemnos, *Bollettino d'Arte* 42, 193.
- 1964 *Poliochni, Città Preistorica nell'Isola di Lemnos I*.

- BROCK, J. K.
AND MACKWORTH YOUNG, G.
1949 Excavations in Siphnos, *Annual of the British School of Archaeology at Athens* 44, 1.
- BRODIE N., DOOLE J., GAVALAS G.
AND RENFREW C. (EDS.)
2008 *Horizon: A Colloquium on the Prehistory of the Cyclades*, Cambridge, McDonald Institute.
- BROGNIART, A. AND RIOCREUX D.
1845 *Description méthodique du Musée de Céramique de la manufacture Royale de Porcelaine de Sèvres*.
- BROODBANK, C.
1989 The Longboat and Society in the Cyclades in the Keros-Syros Culture, *American Journal of Archaeology* 93, 319–37.
1999 Colonisation and Configuration in the insular Neolithic of the Aegean, in P. Halstead (ed.), *Neolithic Society in Greece*, Sheffield, Sheffield Academic Press, 15–41.
2000 *Island Archaeology of the Early Cyclades*, Cambridge, Cambridge University Press.
2007 The Pottery, in C. Renfrew, C. Doumas et al., *Keros, Dhaskalio Kavos, the Investigations of 1987–88*, Cambridge, McDonald Institute, 115–264.
- BUCHANAN, B.
1960 *Ancient Near Eastern Cylinder Seals in the Ashmolean Museum I*.
- BUCHHOLZ, H-G.
1958 Der Kupferhandel des zweiten vorchristlichen Jahrtausends, in Grumach, E. (ed.), *Festschrift zum 80. Geburtstag von Johannes Sundwall*.
1962 Der Pfeilglätter aus dem VI. Schachtgrab von Mykene und die Helladischen Pfeilspitzen, *Jahrbuch des Deutschen Archäologischen Instituts* 77, 1.
- 1965 Die Schleuder als Waffe im ägäischen Kulturkreis, *Anadolu Araştırmaları* 2, 135.
- BUCK, R. J.
1962 The Minoan Thalassocracy re-examined, *Historia* 11, 129.
1964 Middle Helladic matt-painted pottery, *Hesperia* 33, 231.
1966 The Middle Helladic Period, *Phoenix* 20, 193.
- BUDDE, L. AND NICHOLLS, R.
1964 *A Catalogue of Greek and Roman Sculpture in the Fitzwilliam Museum*, Cambridge.
- BULLE, H.
1909 *Orchomenos, I, Die ältesten Ansiedlungsschichten*.
- BURNHAM, H. H.
1965 Çatal Hüyük – The textiles and twined fabrics, *Anatolian Studies* 15, 169.
- BURSIAN, C.
1872 *Geographie von Griechenland II. Die Inselwelt*.
- CADOGAN, G.
1966 An Egyptian flint knife from Knossos, *Annual of the British School of Archaeology at Athens* 61, 147.
- CAHN, H. A.
1965 *Early Art in Greece* (Exhibition catalogue, André Emmerich Gallery, New York).
- CALEY, E. R.
1949 On the prehistoric use of arsenical copper in the Aegean region, *Hesperia Supplement* 8, 60.
- CAMBI, L.
1958–59 I metalli dei cimeli della grotta tombale di Monte Bradone, *Bullettino di Paleontologia Italiana* 12, 221.
- CAMPBELL-SMITH, W.
1963 Jade axes from sites in the British Isles, *Proceedings of the Prehistoric Society* 29, 133.

- 1965 The distribution of jade axes in Europe, *Proceedings of the Prehistoric Society* 31, 25.
- CANN, J. R. AND RENFREW, C.
 1964 The characterisation of obsidian and its application to the Mediterranean region, *Proceedings of the Prehistoric Society* 30, 111.
- CARTER, T.
 2008 The Consumption of Obsidian in the Early Bronze Age Cyclades, in N. Brodie et al. (eds.), *Horizon: A Colloquium on the Prehistory of the Cyclades*, Cambridge, McDonald Institute, 225–36.
- CASKEY, J. L.
 1954 Excavations at Lerna 1952–3, *Hesperia* 23, 3.
 1955a Excavations at Lerna 1954, *Hesperia* 24, 25.
 1955b The House of Tiles at Lerna – an Early Bronze Age palace, *Archaeology* 8, 116.
 1956 Excavations at Lerna 1955, *Hesperia* 25, 147.
 1957 Excavations at Lerna 1956, *Hesperia* 26, 142.
 1958 Excavations at Lerna 1957, *Hesperia* 27, 125.
 1959 Activities at Lerna 1958–1959, *Hesperia* 28, 202.
 1960a The Early Helladic period in the Argolid, *Hesperia* 29, 285.
 1960b Lerna, the Cyclades and Crete, *American Journal of Archaeology* 64, 183.
 1962 Excavations in Keos, 1960–61, *Hesperia* 31, 263.
 1964a Greece, Crete and the Aegean Islands in the Early Bronze Age, *Cambridge Ancient History* I, Ch. 26.
 1964b Excavations in Keos, 1963, *Hesperia* 33, 314.
 1964c *Chalandriani in Syros, Essays in Memory of Karl Lehmann*.
 1964d Excavations in Keos, *Archaiologikon Deltion* 19, 413.
- 1966 Excavations in Keos, 1964–1965, *Hesperia* 35, 363.
- 1969 Crises in the Minoan-Mycenaean World, *Proceedings of the American Philosophical Society* 113, No. 6, 433.
- 1970 Recent discoveries at Aghia Irini in Kea, Paper delivered to the Annual Conference of the Prehistoric Society, April 1970.
- CASKEY, J. L. AND CASKEY, E. G.
 1960 The earliest settlements at Eutresis: Supplementary Excavations, 1958, *Hesperia* 29, 126.
- CASSIRER, E.
 1944 *An Essay on Man*.
- CASSON, S.
 1926 *Macedonia, Thrace and Illyria*.
- CATLING, H. W.
 1964 *Cypriot Bronzework in the Mycenaean World*.
- CATLING, H. W., BLIN-STOYLE, A. E. AND RICHARDS, E. E.
 1963 Correlations between composition and provenance of Mycenaean and Minoan pottery, *Annual of the British School of Archaeology at Athens* 58, 94.
- CATLING, H. W. AND KARAGEORGHIS, V.
 1960 Minoika in Cyprus, *Annual of the British School of Archaeology at Athens* 55, 109.
- CATLING, H. W. AND MILLETT, A.
 1969 Theban stirrup-jars: questions and answers, *Archaeometry* 11, 3.
- CHADWICK, J.
 1963 The prehistory of the Greek language, *Cambridge Ancient History* II. Ch. 39.
 1975 The Prehistory of the Greek Language, in I. E. S. Edwards, C. J. Gadd, N. G. L. Hammond and E. Sollberger (eds.), *The Cambridge Ancient History II.2: History of the Middle East and the Aegean Region, ca. 1380–1300*, Cambridge, Cambridge University Press, 805–19.

- 1976 *The Mycenaean World*, Cambridge, Cambridge University Press.
- CHAPMAN, J.
- 2000 *Fragmentation in Archaeology: People, Places and Broken Objects in the Prehistory of South-Eastern Europe*, London, Routledge.
- CHAPOUTIER, F.
- 1938 *Deux épées d'apparat*.
- 1953 *Le Trésor de Tod*.
- CHAPOUTIER, F. AND CHARBONNEAUX, J.
- 1928 *Fouilles exécutées à Mallia: Premier Rapport 1922–1924*.
- CHAPOUTIER, F. AND DEMARGNE, P.
- 1942 *Fouilles exécutées à Mallia, Troisième Rapport*.
- 1962 *Fouilles exécutées à Mallia, Quatrième Rapport*.
- CHARBONNEAUX, J.
- 1925 *Trois armes d'apparat du palais de Mallia, Monuments et Mémoires* (Monuments Piot) 33, 1.
- CHARLES, J. A.
- 1967 Early arsenical Bronzes – a metallurgical view, *American Journal of Archaeology* 71, 21.
- 1968 The first Sheffield Plate, *Antiquity* 42, 278.
- CHERRY, J. F.
- 1982 A preliminary Definition of Site Distribution on Melos, in C. Renfrew and J. M. Wagstaff (eds.), *An Island Polity, the Archaeology of Exploitation in Melos*, Cambridge, Cambridge University Press, 10–23.
- 1984 The Emergence of the State in the prehistoric Aegean, *Proceedings of the Cambridge Philosophical Society* 30, 18–48.
- 1986 Politics and Palaces: Some Problems in Minoan State Formation, in C. Renfrew and J. F. Cherry (eds.), *Peer Polity Interaction and Socio-political Change*, Cambridge, Cambridge University Press, 19–45.
- 1990 The first Colonisation of the Mediterranean Islands: A Review of recent Research, *Journal of Mediterranean Archaeology* 3, 145–221.
- 2003 Archaeology beyond the Site: Regional Survey and its Future, in R. Leventhal and J. Papadopoulos (eds.), *Theory and Practice in Mediterranean Archaeology: Old and New World Perspectives*, Los Angeles, Cotsen Institute of Archaeology at UCLA, 137–60.
- 2004 Chapter 14 revisited: Sites, Settlements and Population in the prehistoric Aegean since *The Emergence of Civilisation*, in J. C. Barrett and P. Halstead (eds.), *The Emergence of Civilisation Revisited*, (Sheffield Studies in Aegean Archaeology 6), Oxford, Oxbow Books, 1–20.
- CHERRY, J. F., DAVIS, J. L. AND MANZOURANI, E.
- 1991 *Landscape Archaeology as Long-term History: Northern Keos in the Cycladic Islands from Earliest Settlement to Modern Times*, Los Angeles, UCLA Institute of Archaeology.
- CHILDE, V. G.
- 1915 On the date and origin of Minyan Ware, *Journal of Hellenic Studies* 35, 196.
- 1924 A gold vase of Early Helladic type, *Journal of Hellenic Studies* 44, 163.
- 1925 *The Dawn of European Civilisation*, 1st Edition.
- 1927 The Danube thoroughfare and the beginnings of Civilisation in Europe, *Antiquity* 1, 79.
- 1929 *The Danube in Prehistory*.
- 1930 The roots of Hellenism, *Nature* 126, 340.
- 1936a *Man Makes Himself*, London, Watts.
- 1936b The axes from Maikop and Caucasian metallurgy, *Liverpool Annals of Archaeology and Anthropology* 23, 113.
- 1942 *What Happened in History*, Harmondsworth, Penguin.
- 1950a *Prehistoric Migrations in Europe* (Instituttet for sammenlignende

- Kulturforskning. Series A: Forelesninger 20).
- 1950b The urban revolution, *The Town Planning Review* 21, No. 1, 3.
- 1951a *Social Evolution*.
- 1951b The significance of the sling for Greek prehistory, *Studies Presented to David M. Robinson* I, 1.
- 1954a *New Light on the Most Ancient East*.
- 1954b Rotary motion, in Singer, C., Holmyard, E. J., and Hall, A. R. (eds.), *History of Technology* I, 187.
- 1956 *Piecing Together the Past*.
- 1957a *The Dawn of European Civilisation*.
- 1957b Civilisation, cities and towns, *Antiquity* 31, 36.
- 1958a Retrospect, *Antiquity* 32, 68–74.
- 1958b The relations between Greece and prehistoric Europe, *Proceedings of the Second International Congress of Classical Studies* I, General Part, 293, Copenhagen.
- CHISHOLM, M.
- 1966 *Geography and Economics*.
- CHOURMOUZIADES, G. H.
- 1979 *To Neolithiko Dimini*, Volos, Etaireia Thessalikon Erevnon.
- CLARK, J. G. D.
- 1952 *Prehistoric Europe, the Economic Basis*.
- 1961 *World Prehistory – an Outline*.
- CLARKE, D. L.
- 1968 *Analytical Archaeology*.
- 1973 Archaeology, the Loss of Innocence, *Antiquity* 47, 6–18.
- COE, M. D.
- 1962 Social typology and tropical forest civilisations, *Comparative Studies in Society and History* 4, 65.
- COGHLAN, H. H.
- 1956 *Notes on Prehistoric and Early Iron in the Old World* (Pitt Rivers Museum Occasional Papers on Technology 8).
- COLDSTREAM, J. N.
- 1970 Kythera, the change from Early Helladic to Early Minoan, Paper delivered to the Sheffield Symposium on Bronze Age Migrations in the Aegean, March 1970.
- COLEMAN, J. E.
- 1977 *Keos I: Kephala, a Late Neolithic Settlement and Cemetery*, Princeton, Princeton University Press.
- COLLINGWOOD, R. G.
- 1946 *The Idea of History*.
- COMTE, A.
- 1875 *The Positive Philosophy*, trans. Harriet Martineau.
- COOK, J. M.
- 1946 Archaeology in Greece, *Journal of Hellenic Studies* 66, 108.
- CROSSLAND, R. A.
- 1967 Immigrants from the North, *Cambridge Ancient History* I, Ch. 27.
- CROWFOOT, G. M.
- 1936–37 On the warp-weighted loom, *Annual of the British School of Archaeology at Athens* 37, 36.
- 1954 Textiles, basketry and mats in Singer, C., Holmyard, E. J. and Hall, A. D. (eds), *A History of Technology* I, 413.
- CULLEN, T. (ED.)
- 2001 *Aegean Prehistory: a Review*, Boston, Archaeological Institute of America.
- DALTON, G.
- 1960 A note in clarification of economic surplus, *American Anthropologist* 62, 483.
- 1963 Economic surplus once again, *American Anthropologist* 65, 389.
- DANIEL, G. E.
- 1950 *A Hundred Years of Archaeology*.
- DANIEL, G. E. AND EVANS, J. D.
- 1967 The Western Mediterranean, *Cambridge Ancient History* II, Ch. 37.

- DAUX, G.
 1959 Chronique des fouilles en 1958, *Bulletin de Correspondance Hellénique* 83.
 1962 Chronique des fouilles, *Bulletin de Correspondance Hellénique* 86.
- DAVIES, O.
 1929 Two north Greek mining towns, *Journal of Hellenic Studies* 49, 89.
 1935 *Roman Mines in Europe*.
- DAVIS, J. L.
 1986 *Keos V. Agia Irini Period V*, Mainz, von Zabern.
 1992 Review of Aegean Prehistory I: The Islands of the Aegean, *American Journal of Archaeology* 96, 699–756.
- DAVIS, J. L. AND CHERRY, J. F. (EDS.)
 1979 *Papers in Cycladic Prehistory*, Los Angeles, Cotsen Institute of Archaeology at UCLA.
- DAWKINS, R. M.
 1904–5 Excavations at Palaikastro IV, *Annual of the British School of Archaeology at Athens* 11, 271.
- DAWKINS, R. M. AND DROOP, J. P.
 1910–11 The excavations at Phylakopi in Melos, *Annual of the British School of Archaeology at Athens* 17, 1.
- DAY, P. M. AND DOONAN, R. C. P. (EDS.)
 2007 *Metallurgy in the Early Bronze Age Aegean* (Sheffield Studies in Aegean Archaeology 7), Oxford, Oxbow Books.
- DAY, P. M., WILSON, D. E. AND KIRIATZI, E.
 1997 Reassessing Specialization in prepalatial Cretan Ceramic Production, in R. Laffineur and P. Betancourt (eds.), *TEXNE: Craftsmen, Craftswomen and Craftsmanship in the Aegean Bronze Age* (Aegaeum 16), Liège, Université de Liège, 275–89.
- DEMAKOPOULOU, K.
 1998 *Kosmimata tis Ellinikis Proistorias, o Neolithikos Thesavros*, Athens, Tameio Archaologikon Poron.
- DEMANGEL, R.
 1926 *Le Tumulus dit de Protésilaos*.
- DEMARGNE, P. AND GALLET DE SANTERRE H.
 1953 *Fouilles Exécutées à Mallia: Exploration des Maisons et Quartiers d'Habitation*.
- DEMOULE, J.-P. AND PERLÈS, C.
 1993 The Greek Neolithic—a new review, *Journal of World Prehistory* 7, 355–416.
- DESBOROUGH, V. R. D' A.
 1964 *The Last Mycenaeans and their Successors*.
- DESHAYES, J.
 1960 *Les Outils de Bronze de l'Indus au Danube* (Institut Français de Beyrouth, Bibliothèque Archéologique et Historique 71).
- DIAMANT, S. AND RUTTER, J.
 1969 Horned objects in Anatolia and the Near East, *Anatolian Studies* 11, 147.
- DICKINSON, O.
 1994 *The Aegean Bronze Age*, Cambridge, Cambridge University Press.
 2006 *The Aegean from Bronze Age to Iron Age*, London, Routledge.
- DIKAIOS, P.
 1953 *Khirokitia. Final Report on the Excavations of a Neolithic Settlement in Cyprus on behalf of the Department of Antiquities, 1936–1946*.
- DOBZHANSKY, T.
 1962 *Mankind Evolving*.
- DÖRPFELD, W.
 1902 *Troja und Ilion*.
 1927 *Alt-Ithaka*.

- DOR, L., JANNORAY, J.
AND VAN EFFENTERRE, H. AND M.
1960 *Kirrha, Étude de Préhistoire Phocidienne*.
- DOUMAS, C.
1962 Anaskaphai en Naxo, *Archaiologikon Deltion* 17, 272.
1963 Chronika – Kyklades, *Archaiologikon Deltion* 18, 275.
1964 Archaiotites kai mnimeia Kykladon 1963, *Archaiologikon Deltion* 19, 409.
1965 Korphi t'Aroniou, *Archaiologikon Deltion* 20, 41.
1969 *Cycladic Art, the N. P. Goulandris Collection*.
1977 *Early Bronze Age Burial Habits in the Cyclades* (Studies in Mediterranean Archaeology 48), Lund, Paul Åströms Förlag.
2008 Chamber of Mystery, in N.Brodie et al. (eds.), *Horizon: A Colloquium on the Prehistory of the Cyclades*, Cambridge, McDonald Institute, 165–76.
in press *The Aegean Early Bronze Age, New Evidence* (Proceedings of the International Conference, Athens, April 2008), Athens, Archaiologiko Institutouto Aigaiakon Spoudon.
- DOUMAS, C. AND LA ROSA, V. (EDS.)
1997 *I Poliochni kai i Proimi Epoche tou Chalkou ston Voreio Aigaio*, Athens, Panepistimiou Athinon.
- DOW, S.
1954 Minoan writing, *American Journal of Archaeology* 58, 77.
- DÜMMLER, F.
1886 Mitteilungen von den griechischen Inseln, *Athenische Mitteilungen* 2, 15.
- DUMONT, A. AND CHAPLAIN, J.
1888 *Les Céramiques de la Grèce propre*.
- EDGAR, C. C.
1897 Prehistoric tombs at Pelos, *Annual of the British School of Archaeology at Athens* 3, 35.
- EFE, T.
2007 The Theories of the 'Great Caravan Route' between Cilicia and Troy: The Early Bronze III Period in inland western Anatolia, *Anatolian Studies* 57, 47–64.
- EHRENBURG, K.
1889 *Die Inselgruppe von Milos*.
- EHRICH, R. W. (ED.)
1954 *Relative Chronologies in Old World Archaeology*.
1965 *Chronologies in Old World Archaeology*.
- ELIA, R. J.
1993 A seductive and troubling Work, *Archaeology* 46, 64–69.
- ELLIOT SMITH, G.
1929 *The Migration of Early Cultures*.
- ELSTER, E. S. AND RENFREW, C. (EDS.)
2003 *Prehistoric Sitagroi: Excavations in Northern Greece, 1968–1970. Volume 2: The Final Report*, (Monumenta Archaeologica 20), Los Angeles, Cotsen Institute of Archeology at UCLA.
- EMERY, F. E.
1969 *Systems Thinking*.
- ENGELS, F.
1884 *The Origin of the Family, Private Property and the State*.
- ETHNIKI STATISTIKI YPERESSIA
TIS ELLADOS
1962a *Katanomi tis Ektaseos tis Choras kata vasikas Kategorias Chriseos* 19. Martiou 1961.
1962b *Plithysmos tis Ellados kata tin Apographin tis* 19. Martiou 1961.
1964 *Agricultural Statistics of Greece, Year 1962*, II.
- EVANS, A. J.
1895 *Cretan Pictographs and the Prae-Phoenician Script with an Account of a Sepulchral Deposit at Hagios Onouphrios*.

- 1905a La classification des époques successives de la civilisation minoenne, in *Comptes Rendus du Congrès International d'Archéologie, Athènes 1905*, 209.
- 1905b The prehistoric tombs of Knossos, *Archaeologia* 59, 391.
- 1921–35 *The Palace of Minos at Knossos, I–IV*.
- 1925 The ring of Nestor, *Journal of Hellenic Studies* 45, 1.
- EVANS, J. D.
- 1956 Bossed bone plaques of the Second Millennium, *Antiquity* 30, 80.
- 1963 A marble statuette bought in Malta and its implications, *A Pedro Bosch-Gimpera* (Festschrift, Mexico City).
- 1964a Excavations in the Neolithic settlement of Knossos, 1957–60. Part I, *Annual of the British School of Archaeology at Athens* 59, 132.
- 1964b Excavations in the Neolithic mound of Knossos, 1958–60, *Bulletin of the Institute of Archaeology, London* 4, 34.
- 1968 Knossos Neolithic Part II, *Annual of the British School of Archaeology at Athens* 63, 267.
- EVANS, J. D. AND RENFREW, C.
- 1966 The Fat Lady of Saliagos, *Antiquity* 40, 218.
- 1968 *Excavations at Saliagos near Antiparos* (British School at Athens Supplementary Volume 5).
- F.A.O.
- 1947 *Report of the F.A.O. Mission for Greece* (Washington, DC).
- FALKENSTEIN, A.
- 1965 Zu den Tontafeln aus Tartaria, *Germania* 43, 269–73.
- FEIBLEMAN, J. K.
- 1956 *The Institutions of Society*.
- FIANDRA, E.
- 1968 A che cosa servivano le cretule di Festos, *Pepragmena tou B' Diethnous Kritologikou Synedriou* I, 383.
- FIEDLER, K. G.
- 1841 *Reise durch alle Theile des Königreiches Griechenland in Auftrag der Königl. Griechischen Regierung in den Jahren 1834 bis 1837*, II.
- FIMMEN, D.
- 1924 *Die kretisch-mykenische Kultur*, 2nd ed.
- FINKELBERG, M.
- 1997 Anatolian Languages and Indo-European Migrations to Greece, *Classical World* 9, 3–20.
- 2005 *Greek and Pre-Greek: Aegean Prehistory and Greek Heroic Tradition*, Cambridge, Cambridge University Press.
- FINLEY, M. I.
- 1954 *The World of Odysseus*.
- 1957 The Mycenaean tablets and economic history, *Economic History Review* 10, 128.
- FISCHER, F.
- 1967 Ägäische Politurmusterware, *Istanbuler Mitteilungen* 17, 22.
- FITTON, J. L. (ED.)
- 1984 *Cycladica, Studies in Memory of N. P. Goulandris*, London, British Museum.
- FLANNERY, K. V.
- 1967a Culture history v. culture process: a debate in American archaeology, *Scientific American* 217, 119.
- 1967b The Olmecs and the Valley of Oaxaca, a model for interregional interaction in Formative Times. Unpublished paper, presented at Dumbarton Oaks, October 1967 and circulated privately.
- 1968 Archaeological systems theory and early Mesoamerica, in Meggers, B. J. (ed.), *Anthropological Archaeology in the Americas*.
- FLANNERY, K. V. AND COE, M. D.
- 1968 Social and economic systems in formative Mesoamerica, in Binford, S. R. and Binford, L. R. (eds.), *New Perspectives in Archaeology*, 267.

- FORBES, R. J.
 1957 *Studies in Ancient Technology* V.
 1964 *Studies in Ancient Technology* IX.
- FORSDYKE, E. J.
 1925 *Prehistoric Aegean Pottery* (British Museum Catalogue, Vases Vol. 1, 1).
 1927 The Mavro Spelio Cemetery at Knossos, *Annual of the British School of Archaeology at Athens* 28, 243.
 1929 Minoan Art, *Proceedings of the British Academy* XV, 45.
- FOSSEY, J. M.
 1969 The prehistoric settlement at Lake Vouliagmeni, Perachora, *Annual of the British School of Archaeology at Athens* 64, 53.
- FRANK, A. G.
 1993 Bronze Age World System Cycles, *Current Anthropology* 34, 393–429.
- FRANKFORT, H.
 1924 *Studies in Early Pottery of the Near East. I, Mesopotamia, Syria and Egypt and their Earliest Interrelations*.
 1927 *Studies in Early Pottery of the Near East. II, Asia, Europe and the Aegean, and their Earliest Interrelations* (Royal Anthropological Institute. Occasional Papers 8).
 1939 *Cylinder Seals*.
 1950 Town planning in ancient Mesopotamia, *Town Planning Review* 21, 98.
 1951 *The Birth of Civilisation in the Near East*.
- FRENCH, D. H.
 1961 Late Chalcolithic pottery in north-west Turkey and the Aegean, *Anatolian Studies* 11, 99.
 1962 Excavations at Can Hasan, first preliminary report, *Anatolian Studies* 12, 27.
 1964 Additional note on Late Chalcolithic pottery in north-west Turkey and the Aegean, *Anatolian Studies* 14, 134.
 1966 Anatolian pottery in the Aegean area, *Anatolian Studies* 16, 49.
- 1967a Index of Prehistoric Sites in Central Macedonia. (Duplicated and circulated privately.)
 1967b Anatolian pottery in the Aegean area, *Anatolian Studies* 17, 36.
 1968 Anatolia and the Aegean in the Third Millennium B.C. (Unpublished Ph.D dissertation, Cambridge University; copies in Cambridge University Library; Institute of Archaeology, London; British School of Archaeology at Athens; British Institute of Archaeology at Ankara.)
- FRISCH, K. VON
 1967 *The Dance Language and Orientation of Bees*.
- FRÖDIN, O. AND PERSSON, A.
 1938 *Asine, Results of the Swedish Excavations, 1922–1930*.
- FURNESS, A.
 1953 The Neolithic pottery of Knossos, *Annual of the British School of Archaeology at Athens* 48, 94.
 1956 Some early pottery of Samos, Kalimnos and Chios, *Proceedings of the Prehistoric Society* 22, 173.
- FURTWÄNGLER, A. AND LOESCHKE, G.
 1886 *Mykenische Vasen. Vorhellenische Thongefässe aus dem Gebiet des Mittelmeeres*.
- FURUMARK, A.
 1941 *The Mycenaean Pottery, Analysis and Classification*.
 1950 The settlement at Ialysos and Aegean history c. 1550–1400 B.C., *Opuscula Archaeologica* 6, 150.
- GALANIDOU, N. AND PERLÈS, C. (EDS.)
 2003 *The Greek Mesolithic: Problems and Perspectives*, London, British School at Athens.
- GALATY, M. L. AND PARKINSON, W. A. (EDS.)
 1999 *Rethinking Mycenaean Palaces, New Interpretations of an Old Idea*, Los

- Angeles, Cotsen Institute of Archaeology at UCLA.
- 2007 *Rethinking Mycenaean Palaces II*, Los Angeles, Cotsen Institute of Archaeology at UCLA.
- GALBRAITH, J. K.
1969 *The Affluent Society*.
- GALE, N. H. AND STOS-GALE, Z. A.
1984 Cycladic Metallurgy, in J. A. MacGillivray and R. L. N. Barber (eds.), *The Prehistoric Cyclades: Contributions to a Workshop on Cycladic Chronology*, Edinburgh, Department of Classical Archaeology, 225–76.
2008 Changing Pattern in prehistoric Cycladic Metallurgy, in N. Brodie et al. (eds.), *Horizon: A Colloquium on the Prehistory of the Cyclades*, Cambridge, McDonald Institute, 387–408.
- GALLET DE SANTERRE, H.
1958 *Délos primitive et archaïque*.
- GARAŠANIN, M. V.
1958 Neolithikum und Bronzezeit in Serbien und Makedonien, 39. *Bericht der Römisch-Germanischen Kommission*, 1.
1961 The Neolithic in Anatolia and the Balkans, *Antiquity* 35, 276.
- GARSTANG, J.
1953 *Prehistoric Mersin: Yümük Tepe in Southern Turkey*.
- GAUSS, W. AND SMETANA, R.
2008 Aegina Kolonna and the Cyclades, in N. Brodie et al. (eds.), *Horizon: A Colloquium on the Prehistory of the Cyclades*, Cambridge, McDonald Institute, 325–38.
- GEJVALL, N.-G.
1937–39 The fauna of the successive settlements of Troy, *Kungl. Humanistiska vetenskapssamfundets i Lund årsberättelse* 1937–38, 51; and *ibid.*, 1938–39, 1.
1969 *Lerna, a preclassical site in the Argolid*, I: *The Fauna*.
- GELB, I. J.
1960 The function of language in the cultural process of expansion of Mesopotamian society, in Kraeling, C. H. and Adams, R. M. (eds.), *City Invincible, an Oriental Institute Symposium*.
1965 The ancient Mesopotamian ration system, *Journal of Near Eastern Studies* 24, 230.
- GEORGAKOPOULOU, M.
2007 Metallurgical Evidence within Early Cycladic Settlements: The Case of Dhaskalio-Kavos, in P. M. Day and R. C. P. Doonan (eds.), *Metallurgy in the Early Bronze Age Aegean* (Sheffield Studies in Aegean Archaeology 7), Oxford, Oxbow Books, 123–34.
- GEROULANOS, I. M.
1956 Oi opsianoï tis Sylloges Trachonon, *Archaeologike Ephemeris* 1956.
- GETZ-GENTLE, P.
1996 *Stone Vessels of the Cyclades in the Early Bronze Age*, University Park, Pennsylvania State University Press.
- GETZ-PREZIOSI, P.
1987 *Sculptors of the Cyclades: Individual and Tradition in the Third Millennium BC*, Ann Arbor, University of Michigan.
1988 *Early Cycladic Art in North American Collections*, Seattle, University of Washington Press.
- GIALOURIS, N.
1957 Dokimastikai erevnai eis ton kolpon tis Pheias Eleias, *Archaeologike Ephemeris* 1957, 31.
- GILL, D. AND CHIPPINDALE, C.
1993 Material and intellectual Consequences of Esteem for Cycladic Figures, *American Journal of Archaeology* 97, 601–59.
- GILL, M. A. V.
1966 Seals and sealings, some comments, *Kadmos* 5, 1.

GIMBUTAS, M.

- 1965 The relative chronology of neolithic and chalcolithic cultures in eastern Europe north of the Balkan peninsula and the Black Sea, in Ehrich, R. W. (ed.), *Chronologies in Old World Archaeology*, 459.

GODART, L.

- 1968 Le grain à Cnossos, *Studi Micenei ed Egeo-Anatolici* 5, 56.

GOLDMAN, H.

- 1931 *Excavations at Eutresis in Boeotia*.
1956 *Excavations at Gözlü Kule, Tarsus*.

GOODISON, L

- 1989 *Death, Women and the Sun: Symbolism of Regeneration in Early Aegean Religion* (Bulletin Supplement 53). London, Institute of Classical Studies.

GOODISON, L. AND MORRIS, M.

- 1998 'Beyond the Great Mother': The sacred World of the Minoans, in L. Goodison and C. Morris (eds.), *Ancient Goddesses*, London, British Museum, 113–32.

GRAHAM, J. W.

- 1960 The Minoan unit of length and Minoan palace planning, *American Journal of Archaeology* 64, 325.
1962 *The Palaces of Crete*.
1964 The relation of the Minoan palaces to the Near Eastern palaces of the Second Millennium, in Bennett, E. L. (ed.), *Mycenaean Studies*, 195.
1970 Egyptian features at Phaistos, *American Journal of Archaeology* 74, 231.

GRAINDOR, P.

- 1904 *Bulletin de Correspondance Hellénique* 28, 309.
1921 *Kykladika*, Le Musée Belge, *Revue de Philologie Classique* 25, 69.

GRAY, R. D. AND ATKINSON, Q. D.

- 2003 Language-tree Divergence Times support the Anatolian Theory of Indo-European Origin, *Nature* 426, 435–39.

GREECE

- 1944 *Greece, Naval Intelligence Division Geographical Handbook*, 3 vols.

GROENWEGEN-FRANKFORT, H. A.

- 1951 *Arrest and Movement*.

HADJIANASTASIOU, O.

- 1988 A late neolithic settlement at Grotta, Naxos, in E. French and K. A. Wardle (eds.), *Problems in Greek Prehistory*, Bristol, Bristol Classical Press, 11–20.

HADJIANASTASIOU, O. AND

MACGILLIVRAY, J. A.

- 1988 An Early Bronze Age Smelting Site on the Aegean Island of Kythnos. Part II. Archaeological Evidence, in J. E. Jones (ed.), *Aspects of Ancient Mining and Metallurgy*, Bangor, Department of Classics, University of North Wales, 31–34.

HÄGG, R. AND MARINATOS, N. (EDS.)

- 1981 *Sanctuaries and Cults in the Aegean Bronze Age*, Stockholm, Paul Åströms Förlag.

HAEVERNICK, T. E.

- 1960 Beiträge zur Geschichte des Antiken Glases III. Mykenisches Glas, *Jahrbuch des Römisch-Germanischen Zentralmuseums, Mainz* 7, 36.

HAGE, P. AND HERARY, F.

- 2007 *Island Networks: Communication, Kinship and Classification Studies in Oceania*. Cambridge, Cambridge University Press.

HALEY, J. B. AND BLEGEN, C. W.

- 1928 The coming of the Greeks, *American Journal of Archaeology* 32, 141.

HALL, J.

- 2000 *Ethnic Identity in Greek Culture*, Cambridge, Cambridge University Press.

HALSTEAD, P.

- 1995 From Sharing to Hoarding: The neolithic Foundations of Aegean Bronze Age Society, in W.-D. Niemeier and R. Laffineur, *POLITEIA: Society and State in the Aegean Bronze Age* (Aegaeum 12), Liège, Université de Liège, 11–20.
- 1996 The Development of Agriculture and Pastoralism in Greece: When, How, Who and What?, in D. R. Harris (ed.), *The Origin and Spread of Agriculture and Pastoralism in Eurasia*, London, UCL Press, 296–309.
- 1999 *Neolithic Society in Greece*, Sheffield, Sheffield Academic Press.
- 2004 Life after Mediterranean Polyculture: The Subsistence Subsystem and the Emergence of Civilisation revisited, in J. C. Barrett and P. Halstead (eds.), *The Emergence of Civilisation Revisited*, (Sheffield Studies in Aegean Archaeology 6), Oxford, Oxbow Books, 189–206.

HALSTEAD, P. AND O'SHEA, J. O.

- 1982 A Friend in Need is a Friend indeed: Social Storage and the Origins of social Ranking, in C. Renfrew and S. Shennan (eds.), *Ranking, Resource and Exchange*, Cambridge, Cambridge University Press, 92–99.

HAMILAKIS, Y.

- 1996 Wine, Oil, and the Dialectics of Power in Bronze Age Crete: A Review of the Evidence, *Oxford Archaeological Journal* 15, 1–32.
- 2002 What Future for the 'Minoan' Past: Re-thinking Minoan Archaeology, in Y. Hamilakis (ed.), *Labyrinth Revisited, Rethinking 'Minoan' Archaeology*, Oxford, Oxbow Books, 1–28.

HAMPE, R. AND WINTER, A.

- 1962 *Bei Töpfern und Töpferinnen in Kreta*.

HANSEN, J.M.

- 1988 Agriculture in the prehistoric Aegean: Data versus Speculation, *American Journal of Archaeology* 92, 39–52.

HARLAN, J. R.

- 1967 A wild wheat harvest in Turkey, *Archaeology* 20, 197.

HARLAN, J. R. AND ZOHARY, D.

- 1966 The distribution of wild wheats and barleys, *Science* 153, 1078.

HASLUCK, F. W.

- 1910–11 Depopulation in the Aegean Islands, *Annual of the British School of Archaeology at Athens* 17, 151.

HAWKES, C. F. C.

- 1954 Archaeological theory and method: some suggestions from the Old World, *American Anthropologist* 56, 155.

HAYES, W. C., ROWTON, M. B.

AND STUBBINGS, F. H.

- 1962 Egypt; Western Asia; Aegean Bronze Age in 'Chronology', *Cambridge Ancient History* I, Ch. 6.

HEATH, M. C.

- 1958 Early Helladic clay sealings from the House of the Tiles at Lerna, *Hesperia* 27, 81.

HEERMANCE, T. W. AND LORD, G. D.

- 1897 Pre-Mycenaean graves in Corinth, *American Journal of Archaeology*, 2nd ser., 1, 313.

HEIDENREICH, R.

- 1935–36 Vorgeschichtliches in der Stadt Samos. Die Funde, *Athenische Mitteilungen* 60/61, 125.

HELBAEK, H.

- 1961 Late Bronze Age and Byzantine Crops at Beycesultan in Anatolia, *Anatolian Studies* 11, 77.
- 1962 Late Cypriote vegetable diet at Apliki, *Opuscula Athenensia* 4, 171.
- 1966 Wheat farming produce at Cypriote Kalopsidha, in Åström, P., *Excavations at Kalopsidha and Aghios Iakovos in Cyprus*.
- 1969 Plant collecting, dry-farming and irrigation agriculture in prehistoric Deh

- Luran, Appendix in Hole, F., Flannery, K. V. and Neely, J. A., *Prehistory and Human Ecology of the Deh Luran Plain*.
- HELMS, M.
1988 *Ulysses' Sail: An Ethnographic Odyssey of Power, Knowledge and Geographical Distance*, Princeton, Princeton University Press.
- HEMINGWAY, E. M. M.
1969 Prehistoric settlement patterns in the Aegean in the Neolithic and Early Bronze Age. Unpublished undergraduate dissertation, Department of Ancient History, University of Sheffield.
- HENDRIX, E.
2003 Painted Early Cycladic Figures: An Exploration of Context and Meaning, *Hesperia* 72, 405–46.
- HERRMAN, G.
1968 Lapis lazuli: the early phases of its trade, *Iraq* 30, 21.
- HERSKOVITS, M.
1940 *Economic Anthropology*.
- HESTER, D. H.
1957 The pre-Greek place names in Greece and Asia Minor, *Revue Hittite et Asiatique* 15, 107.
- HEURTLEY, W. A.
1934–35 Excavations in Ithaca II: the Early Helladic settlement at Pelikata, *Annual of the British School of Archaeology at Athens* 35, 1–44.
1939 *Prehistoric Macedonia*.
- HIGGINS, R. A.
1957 The Aegina treasure reconsidered, *Institute of Classical Studies Bulletin* 4, 27.
1961 *Greek and Roman Jewellery*.
1967 *Minoan and Mycenaean Art*.
- HIGGS, E. S.
1968 The Stone Age industries of Greece, *La Préhistoire* 1968, 223.
- HIGGS, E. S., VITA-FINZI, C., HARRIS, D. R. AND FAGG, A. E.
1967 The climate, environment and industries of Stone Age Greece, Part III, *Proceedings of the Prehistoric Society* 33, 1.
- HITCHCOCK, L. A., LAFFINEUR, R. AND CROWLEY, J. (EDS.)
2008 *DAIS, The Aegean Feast* (Aegaeum 29). Liège, Université de Liège.
- HODGES, H.
1964 *Artifacts*.
- HÖCKMANN, O.
1968 Zu Formenschatz und Ursprung der schematischen Kykladenplastik, *Berliner Jahrbuch für Vor- und Frühgeschichte* 8, 45.
- HOFFMAN, G.
2002 Painted Ladies: Early Cycladic II mourning Figures, *American Journal of Archaeology* 106, 525–50.
- HOGARTH, D. G.
1898 Excavations in Melos 1898, *Annual of the British School of Archaeology at Athens* 4, 1.
1927 Aegean sepulchral figurines, *Essays Presented to Sir Arthur Evans*, 55.
- HOLE, F.
1966 Investigating the origins of Mesopotamian Civilisation, *Science* 153, 605.
1968 Evidence for social organisation from western Iran, 8000–4000 B.C., in Binford, S. R. and Binford, L. R. (eds.), *New Perspectives in Archaeology*, 245.
- HOLE, F. AND FLANNERY, K. V.
1967 The prehistory of south-western Iran, *Proceedings of the Prehistoric Society* 33, 147.
- HOLMBERG, E. J.
1944 *The Swedish Excavations at Asea in Arcadia* (Skrifter utgivna av Svenska institutet i Rom, 11).

HOOD, M. S. F.

- 1954 Notice of excavations at Emborio in Chios, *Journal of Hellenic Studies* 74, 162-63.
- 1956 Another warrior grave at Agios Ioannis near Knossos, *Annual of the British School of Archaeology at Athens* 51, 81.
- 1960 Tholos tombs of the Aegean, *Antiquity* 35, 166.
- 1961 The Early Bronze Age chronology of the Aegean with special reference to Troy, *Bericht über den V. Internationalen Kongress für Vor- und Frühgeschichte, Hamburg*, 395.
- 1963 Stratigraphical excavations at Knossos 1957-61, *Kretika Chronika* 17, 92.
- 1965a Excavations at Emborio, Chios 1952-55, *Atti del VI. Congresso Internazionale delle Scienze Preistoriche e Protoistoriche II*, 224-27.
- 1965b Minoan sites in the far west of Crete, *Annual of the British School of Archaeology at Athens* 60, 99.
- 1967 Some ancient sites in south-west Crete, *Annual of the British School of Archaeology at Athens* 62, 47.
- n.d. *Archaeological Survey of the Knossos Area*. (British School at Athens.)

HOOD, M. S. F. AND DE JONG, P.

- 1952 Late Minoan warrior Graves from Ayios Ioannis and the New Hospital site at Knossos, *Annual of the British School of Archaeology at Athens* 47, 243.

HOOD, M. S. F. AND WARREN, P.

- 1966 Ancient sites in the province of Aghios Vasilios, *Annual of the British School of Archaeology at Athens* 61, 163.

HOOD, M. S. F., WARREN, P.
AND CADOGAN, G.

- 1964 Travels in Crete, 1962, *Annual of the British School of Archaeology at Athens* 59, 50.

HOOKE, J. T.

- 1969 Homer and Late Minoan Crete, *Journal of Hellenic Studies* 89, 60.

HOPE SIMPSON, R.

- 1965 *A Gazetteer and Atlas of Mycenaean Sites*. (Institute of Classical Studies Bulletin Supplement 16).

HOPE SIMPSON, R. AND DICKINSON, O.

- 1979 *A Gazetteer of Aegean Civilisation in the Bronze Age, Volume I: the Mainland and Islands* (Studies in Mediterranean Archaeology and Literature 52), Göteborg, Paul Åströms Förlag.

HOPE SIMPSON, R. AND LAZENBY, J. F.

- 1962 Notes from the Dodecanese, *Annual of the British School of Archaeology at Athens* 57, 154.

HOPE, M.

- 1961 Pflanzenfunde aus Lerna/Argolis, *Der Züchter* 31, 239.
- 1962 Nutzpflanzen vom Lernäischen Golf, *Jahrbuch des Römisch-Germanischen Zentralmuseums Mainz* 9, 1.

HOWELL, R. J.

- 1970 Middle Helladic terminology in the light of Lerna and Lefkandi. Paper delivered to the Annual Conference of the Prehistoric Society, London, April 1970.

HOWELLS, W. W.

- 1960 Estimating population numbers through archaeological and skeletal remains, in Heizer, R. F. and Cook, S. F. (eds.), *The Application of Quantitative Methods in Archaeology* (Viking Fund Publications in Anthropology 28), 158.

HUIZINGA, J.

- 1949 *Homo Ludens*.

HUTCHINSON, R. W.

- 1950 Prehistoric town planning in Crete, *Town Planning Review* 21, No. 3, 199.
- 1952-53 Prehistoric town planning in and around the Aegean, *Town Planning Review* 23, 261.
- 1954 Minoan chronology reviewed, *Antiquity* 28, 155.
- 1962 *Prehistoric Crete*.

- IMMERWAHR, S. A.
1966 The use of tin on Mycenaean vases, *Hesperia* 35, 381.
- ISARD, W.
1960 *Methods of Regional Analysis, an Introduction to Regional Studies*.
- JACOBSEN, T. AND ADAMS, R. M.
1958 Salt and silt in ancient Mesopotamian agriculture, *Science* 128, 1251.
- JACOBSEN, T. W.
1969 Explorations at Porto Cheli and Vicinity, Preliminary Report II: The Franchthi Cave 1967–1968, *Hesperia* 38, 343.
1969b A group of Early Cycladic vases in the Benaki Museum in Athens, *Archäologischer Anzeiger* 1969, 223.
- JAMESON, M., RUNNELS, C.
AND VAN ANDEL, C.
1994 *The Greek Countryside: The Southern Argolid from Prehistory to the Present Day*, Stanford, Stanford University Press.
- JARMAN, M. R. AND JARMAN, H. N.
1968 The fauna and economy of Early Neolithic Knossos, *Annual of the British School of Archaeology at Athens* 63, 241.
- JOHNSON, M.
1999 Chronology of Greece and south-east Europe in the final Neolithic and Early Bronze Age, *Proceedings of the Prehistoric Society* 65, 319–36.
- KAHRSTEDT, U.
1913 Zur Kykladenkultur, *Athenische Mitteilungen* 38, 166.
- KALICZ, N.
1963 *Die Peceler (Baden) Kultur und Anatolien*.
- KANTOR, H. J.
1947 The Aegean and the Orient in the second millennium B.C., *American Journal of Archaeology* 51, 1.
- 1954 The chronology of Egypt, in Ehrich, R. W. (ed.), *Relative Chronologies in Old World Archaeology*, I.
- 1965 Egypt and its foreign correlations before the Late Bronze Age, in Ehrich, R. W. (ed.), *Chronologies in Old World Archaeology*, I.
- KARANTZALI, E.
1996 *Le Bronze Ancien dans les Cyclades et en Crète* (BAR International Series 631), Oxford, Tempus Reparatum.
2008 The Transition from EBI to EBII in the Cyclades and Crete, in N. Brodie et al. (eds.), *Horizon: A Colloquium on the Prehistory of the Cyclades*, Cambridge, McDonald Institute, 241–60.
- KARO, G.
1930 Archäologische Funde, *Archäologischer Anzeiger* 1930, 135.
1932 Archäologische Funde, *Archäologischer Anzeiger* 1932, 103.
1933a *Die Schachtgräber von Mykänai*.
1933b Archäologische Funde, *Archäologischer Anzeiger* 1933, 191.
- KATZ, D. AND KAHN, R. L.
1966 *The Social Psychology of Organisations*.
- KAYSER, B. AND THOMPSON, K.
1964 *Economic and Social Atlas of Greece*.
- KENDALL, D. G.
1969 Incidence matrices, internal graphs and seriation in archaeology, *Pacific Journal of Mathematics* 28, No. 3, 565.
- KENNA, V. G.
1960 *Cretan Seals*.
1962 Seals and script, *Kadmos* 1, 1.
- KEYNES, J. M.
1937 *The General Theory of Employment, Interest and Money*.
- KILIAN, K.
1988 The Emergence of the *wanax* Ideology in the Mycenaean Palaces, *Oxford Journal of Archaeology* 7, 291–302.

- KILLEN, J. T.
 1964 The wool industry of Crete in the Late Bronze Age, *Annual of the British School of Archaeology at Athens* 59, 1.
 1985 The Linear B Tablets and the Mycenaean Economy, in A. Morpurgo Davies and Y. Duhoux (eds.), *Linear B: A 1984 Survey*, Louvain-la-Neuve, Bibliothèque des Cahiers Linguistiques de Louvain, 241–305.
- KILLEN, J. T. AND VOUTSAKI, S. (EDS.)
 2001 *Economy and Politics in the Mycenaean Palatial States*, Cambridge, Cambridge Philosophical Society.
- KLINDT-JENSEN, O.
 1957 *Denmark*.
- KLUCKHOHN, C.
 1960 The moral order in the expanding society, in Kraeling, C. H. and Adams, R. M. (eds.), *City Invincible: an Oriental Institute Symposium*.
- KNORRINGA, H.
 1926 *Emporos*.
- KÖHLER, U.
 1884 Prähistorisches von den griechischen Inseln, *Athenische Mitteilungen* 9, 156.
- KOHLER, E. L. AND RALPH, E. K.
 1961 C-14 dates for sites in the Mediterranean area, *American Journal of Archaeology* 65, 359.
- KONTOLEON, N. M.
 1949–51 Naxos, *Ergon tis Archaïologikis Etaireias*, 1949, 112; 1950, 269; 1951, 214.
 1949 Chronique, *Bulletin de Correspondance Hellénique* 73, 533.
 1958–61 Naxos, *Ergon tis Archaïologikis Etaireias*, 1958, 165; 1959, 125; 1960, 185; 1961, 197.
 1965 Zwei beschriftete Scherben aus Naxos, *Kadmos* 4, 83.
- KORDELLAS, A.
 1902 *O Metalleikos Ploutos kai ai Alykai tis Ellados*.
- KOŞAY, H. AND AKOK, M.
 1957 *Ausgrabungen von Büyük Güllücek*. (Türk Tarih Kurumu Yayınlarından, v. seri, No. 16).
- KOŞAY, H. AND SPERLING, J.
 1936 *Troad'da dört yerleşme yeri*.
- KOSMOPOULOS, L. W.
 1948 *The Prehistoric Inhabitation of Corinth*.
- KOUKA, O.
 2008 Diaspora, Presence or Interaction? The Cyclades and the Greek Mainland from the Final Neolithic to Early Bronze II, in N. Brodie et al. (eds.), *Horizon: A Colloquium on the Prehistory of the Cyclades*, Cambridge, McDonald Institute, 271–80.
- KRADER, L.
 1968 *The Formation of the State*.
- KRAELING, C. H. AND ADAMS, R. M. (EDS.)
 1960 *City Invincible, A Symposium on Urbanisation and Cultural Development in the Ancient Near East*.
- KROEBER, A. L.
 1917 The Superorganic, *American Anthropologist* 19, 163.
 1963 *Style and Civilisations*.
- KROEBER, A. L. AND KLUCKHOHN, C.
 1952 *Culture, a critical review of concepts and definitions* (Papers of the Peabody Museum of American Archaeology and Ethnology 47, No. 1).
- KUNZE, E.
 1931 *Orchomenos. II. Die neolithische Keramik* (Abhandlungen der Bayerischen Akademie der Wissenschaften, phil.-hist. Abt., n.F. 5).
 1934 *Orchomenos III. Die Keramik der frühen Bronzezeit* (Abhandlungen der Bayerischen Akademie der Wissenschaften, phil.-hist. Abt., n.F. 8).
 1960 Die Ausgrabungen in Olympia 1952–58, *Archaiologikon Deltion* 16, 127.

- KUZARA, R.S., MEAD., G. R.
AND DIXON, K. A.
1966 Seriation of anthropological data: a computer program for matrix ordering, *American Anthropologist* 68, 1442.
- KYRIAKIDIS, E.
2005 *Ritual in the Aegean: The Minoan Peak Sanctuaries*, London, Duckworth.
- LAFFINEUR, R. AND BETANCOURT, P. (EDS.)
1997 *TEXNH: Craftsmen, Craftswomen and Craftsmanship in the Aegean Bronze Age* (Aegaeum 16), Liège, Université de Liège.
- LAMB, W.
1932 Schliemann's prehistoric sites in the Troad, *Prähistorische Zeitschrift* 23, 111.
1936a *Excavations at Thermi in Lesbos*.
1936b *Excavations at Kusura near Afyon Karahisar*, *Archaeologia* 86, 1.
- LAWRENCE, A. W.
1957 *Greek Architecture*.
- LAZARIDES, D.
1961 Notice of excavations at Dikili Tash, *Ergon tis Archaïologikis Etaireias* 1961, 82.
- LEAGUE OF NATIONS
1939 *Conference on Rural Life*.
- LEPSIUS, G. R.
1890 *Griechische Marmorstudien*.
- LEVI, D.
1925-26a La Grotta di Aspripetra a Coò, *Annuario della Regia Scuola Archeologica di Atene* 8.
1925-26b La necropoli geometrica di Kardiatì a Tenos, *Annuario della Regia Scuola Archeologica di Atene* 8.
1958a Gli scavi a Festos nel 1956 e 1957, *Annuario della Scuola Archeologica di Atene* 19-20, 193.
1958b L'archivio de cretule a Festos, *Annuario della Scuola Archeologica di Atene* 19-20, 1961-62. Gli scavi a Festos negli anni 1958-60, *Annuario della Scuola Archeologica di Atene* 23-24, 377.
- 1963a Le due prime campagne di scavi a Iasos, *Annuario della Scuola Archeologica di Atene* 39-40, 556.
1963b New discoveries at one of the greatest Minoan sites: The palace of Phaistos and the tholos tomb of Kamilari. Part I, *Illustrated London News*, 1963, 134.
1964a La critica degli archeologi, *La Parola del Passato* 96, 161.
1964b *The recent excavations at Phaistos* (Studies in Mediterranean Archaeology 11).
1965 New discoveries in Carian Iasos, *Illustrated London News*, August 7, 1965.
1967 Le Campagne 1962-1964 a Iasos, *Annuario della Scuola Archeologica di Atene* 43-44, 401.
- LEWIN, K.
1952 *Field Theory in Social Science*.
- LLOYD, S.
1961 Melting pot of peoples, in Piggott, S. (ed.), *The Dawn of Civilisation*, 161.
- LLOYD, S. AND MELLAART, J.
1962 *Beycesultan. I. The Chalcolithic and Early Bronze Age Levels* (Occasional Publications of the British Institute of Archaeology at Ankara, 6).
- LOGOTHETIS, B. C.
1962 Ai autophyeis ambeloi os protogenes ambelourgikon ulikon en Elladi, *Epeteris tis Geoponikis kai Dhasologikis Scholis, Thessaloniki* 1962.
- LUCAS, A.
1962 *Ancient Egyptian Materials and Industries* (4th edn., revised by J. R. Harris).
1961 Prehistoric habitation in the southwestern Peloponnese, *American Journal of Archaeology* 65, 221.

MACGILLIVRAY, J. A.

- 1980 Mount Kynthos in Delos: The Early Cycladic Settlement, *Bulletin de Correspondence Hellénique* 104, 3–45.

MACGILLIVRAY, J. A.

AND BARBER, R. L. N. (EDS.)

- 1984 *The Prehistoric Cyclades: Contributions to a Workshop on Cycladic Chronology*, Edinburgh, Department of Classical Archaeology.

MACKENZIE, D.

- 1897 Ancient sites in Melos, *Annual of the British School of Archaeology at Athens* 3, 71.
 1898 Excavations in Melos 1898: the Successive Settlements, *Annual of the British School of Archaeology at Athens* 4, 17.
 1903 The pottery of Knossos, *Journal of Hellenic Studies* 23, 157.
 1963 Daybook of the Excavations at Phylakopi in Melos, 1896, 1897, 1898 and 1899. Unpublished transcript by Colin Renfrew; copies available in Athens (Library of the British School of Archaeology), Cambridge (Museum of Classical Archaeology) and Cincinnati (University Library).

MAJEWSKI, K.

- 1935 *Figuralna Plastyka Cycladska. Geneza i rozwój form.* (Archivum Towarzystwa we Lwow VI).

MAKKAY, J.

- 1984, *Early Stamp Seals in South-East Europe*, Budapest, Akademia Kiado.

MALAFOURIS, L.

- 2004 The cognitive Basis of material Engagement: Where Brain, Body and Culture conflate, in E. DeMarrais, C. Gosden and C. Renfrew (eds.), *Rethinking Materiality: The Engagement of Mind with the material World*, Cambridge, McDonald Institute, 53–62.

MALINOWSKI, B.

- 1960 *The Science of Culture and other Essays*.

MALLOWAN, M. E. L.

- 1965 The mechanism of ancient trade in Western Asia, *Iran* 3, 1.

MANNING, S.

- 1994 The Emergence of Divergence: Development and Decline on Bronze Age Crete and the Cyclades, in C. Mathers and S. Stoddart (eds.), *Development and Decline in the Mediterranean Bronze Age*, Sheffield, J. R. Collis, 221–70.
 1995 *The Absolute Chronology of the Aegean Early Bronze Age*, Sheffield, Sheffield Academic Press.
 2008 Some initial wobbly Steps towards a Late Neolithic to Early Bronze III Radiocarbon Chronology for the Cyclades, in N. Brodie et al. (eds.), *Horizon: A Colloquium on the Prehistory of the Cyclades*, Cambridge, McDonald Institute, 55–60.

MARAN, J.

- 1998 *Kulturwandel auf dem griechischen Festland und den Kykladen im späten 3. Jahrtausend v. Chr. Studien zu den kulturellen Verhältnissen in Südosteuropa und dem zentralen sowie östlichen Mittelmeerraum in der späten Kupfer- und frühen Bronzezeit*, Bonn, Habelt.

MARANGO, L.

- 1984 Evidence for the Early Cycladic Period on Amorgos, in J. L. Fitton, (ed.), *Cycladica, Studies in Memory of N. P. Goulandris*, London, British Museum, 99–115.
 1993 Minoa Amorgou, *Ergon tis Archaologikes Etaireias* 1993, 92–99.

MARANGO, L. (ED.)

- 1990 *Cycladic Culture: Naxos in the 3rd Millennium BC*, Athens, Goulandris Foundation.

- MARANGO, L., RENFREW, C.,
DOUMAS, C. AND GAVALAS, G. (EDS.)
2006, *Markiani, Amorgos: An Early Bronze Age Fortified Settlement* (BSA Supplementary Volume 10), London, British School at Athens.
- MARINATOS, S.
1929 Protominoikos tholotos taphos para to chorion Krasí Padiados, *Archaiologikon Deltion* 12, 102.
1933a Funde und Forschungen auf Kreta, *Archäologischer Anzeiger* 1933, 287.
1933b La marine créto-mycénienne, *Bulletin de Correspondance Hellénique* 57, 170.
1946 Greniers de l'Helladique Ancien, *Bulletin de Correspondance Hellénique* 70, 337.
1963 The Minoan-Mycenaean civilisation and its influence on the Mediterranean and on Europe, *Atti del VI. Congresso Internazionale delle Scienze Preistoriche e Protoistoriche* I, 161.
- MARINATOS, S. AND HIRMER, M.
1960 *Crete and Mycenae*.
- MARTHARI, M.
1990 Skarkos: Enas protokykladikos oikismos stin Io, in Idryma N. P. Goulandri, *Mouseio Kykladikis Technis, Dialexeis 1986-1989*, Athens, Goulandris Foundation, 97-100.
2008 Aspects of Pottery Circulation in the Cyclades during the Early Bronze II Period: Fine and semi-fine imported ceramic Wares at Skarkos, Ios, in N. Brodie et al. (eds.), *Horizon: A Colloquium on the Prehistory of the Cyclades*, Cambridge, McDonald Institute, 71-84.
- MARUYAMA, M.
1963 The second cybernetics: deviation amplifying mutual casual processes, *American Scientist* 51, 164.
- MATZ, F.
1928 *Die frühkretischen Siegel*.
1951 *Forschungen auf Kreta*, 1942.
- 1954 Die Ägäis, *Handbuch der Archäologie* II, 179.
- MAUSS, M.
1954 *The Gift*.
- MAXWELL HYSLOP, K. R.
1960 The Ur jewellers, *Iraq* 22.
- MCDONALD, W. A.
AND HOPE SIMPSON, R.
1961 Prehistoric habitation in the south-western Peloponnese, *American Journal of Archaeology* 65, 221.
1964 Further exploration in the south-western Peloponnese, *American Journal of Archaeology* 68, 229.
1969 Further exploration in the south-western Peloponnese: 1964-68, *American Journal of Archaeology* 73, 123.
- MCDONALD, W. A. AND RAPP, G. R. (EDS.)
1972 *The Minnesota Messenia Expedition: Reconstructing a Bronze Age Regional Environment*, Minneapolis, University of Minnesota Press.
- MEHTA, J. K.
1964 *Economics of Growth*.
- MELLAART, J.
1954 Preclassical remains in southern Turkey, *Anatolian Studies* 4, 175.
1957 Anatolian chronology in the Early and Middle Bronze Age, *Anatolian Studies* 7, 55.
1959a Notes on the architectural remains of Troy I and II, *Anatolian Studies* 9, 131.
1959b The royal treasure of Dorak, *Illustrated London News*, November 28, 1959, 754.
1960 Anatolia and the Balkans, *Antiquity* 24, 270.
1962 Anatolia, c. 4000-2300 B.C., *Cambridge Ancient History* I, Ch. 18.
1964a Anatolia before c. 4000 B.C. and c. 2300-1750 B.C., *Cambridge Ancient History* I (Ch. 7, Sect. 11-14; Ch. 24, Sect. 1-6).

- 1964b Excavations at Çatal Hüyük 1963, *Anatolian Studies* 14, 39.
- 1970 Prehistory of Anatolia and its relations with the Balkans, *Symposion International sur l'Ethnogénese des Peuples Balkaniques* (Plovdiv 1969).
- MELLINK, M.
- 1956 The Royal Tombs at Alaca Hüyük, in Weinberg, S. S. (ed.), *The Aegean and the Near East* (Studies in Honour of Hetty Goldman), 29–39.
- 1964 Archaeology in Asia Minor, *American Journal of Archaeology* 68, 125.
- 1965 Excavations at Karataş-Semayük 1964, *American Journal of Archaeology* 69, 243.
- 1965 Anatolian Chronology, in Ehrich, R. W. (ed.), *Chronologies in Old World Archaeology*, 101.
- 1967 Excavations at Karataş-Semayük 1966, *American Journal of Archaeology* 71, 251.
- MERRILLEES, R. S.
- 1962 Opium trade in the Bronze Age Levant, *Antiquity* 36, 287.
- MICHELL, H.
- 1957 *Economics of Ancient Greece*.
- MILLER, J. G.
- 1965 Living systems: structure and process, *Behavioural Science* 10, 337.
- MILLER, W.
- 1908 *The Latins in the Levant*.
- MILLETT, A. AND CATLING, H. W.
- 1967 Composition patterns of Minoan and Mycenaean pottery, *Archaeometry* 10, 70.
- MILLON, R.
- 1967 Teotihuacan, *Scientific American* 216, 44.
- MILOJČIĆ, V.
- 1949 *Chronologie der jüngeren Steinzeit Mittel- und Südosteuropas*.
- 1956 Bericht über die Ausgrabungen auf der Gremnos-Magula bei Larissa 1956, *Archäologischer Anzeiger* 1956, 142.
- 1959 Ergebnisse der deutschen Ausgrabungen in Thessalien 1953–1958, *Jahrbuch des Römisch-Germanischen Zentralmuseums Mainz* 6, 1.
- 1960 Präkeramisches Neolithikum auf der Balkanhalbinsel, *Germania* 38, 320.
- 1961 Samos. I. Die prähistorische Siedlung unter dem Heraion. Grabung 1953 und 1955.
- 1965 Die Tontafeln von Tartaria und die absolute Chronologie des mitteleuropäischen Neolithikums, *Germania* 43, 261.
- 1967 Die absolute Chronologie in Südosteuropa und die Ergebnisse der Radiocarbon Methode, *Jahrbuch des Römisch-Germanischen Zentralmuseums Mainz* 14, 9.
- MILOJČIĆ, V., BOESSNECK, J. AND HOPE, M.
- 1962 *Die Deutschen Ausgrabungen auf der Argissa-Magula in Thessalien. I. Das präkeramische Neolithikum sowie die Tier- und Pflanzenreste* (Beiträge zur Ur- und frühgeschichtlichen Archäologie des Mittelmeer-Kulturraumes).
- MÖBIUS, M.
- 1933 Pflanzenbilder der minoischen Kunst, *Jahrbuch des Deutschen Archäologischen Instituts* 48, 1.
- MONTELIUS, O.
- 1924 and 1928 *La Grèce Préclassique*.
- MORGAN, L. H.
- 1871 *Ancient Society*.
- MORRICONE, L.
- 1950 Scavi e Ricerche a Coa (1935–1943), *Relazione Preliminare, Bollettino d'Arte* 35, 316.
- MORRIS, I. (ED.)
- 1994 *Classical Greece: Ancient Histories and Modern Archaeologies*, New York, Cambridge University Press.
- MOSSO, A.
- 1910 *The Dawn of Mediterranean Civilisation*.

- MÜLLER, K.
 1930 *Tiryns, Die Ergebnisse der Ausgrabungen des Instituts, III, Die Architektur der Burg und des Palastes.*
 1938 *Tiryns, Die Ergebnisse der Ausgrabungen des Instituts, IV, Die Urfirniskeramik.*
- MUMFORD, L.
 1960 University city, in Kraeling, C. H. and Adams, R. M. (eds.), *City Invincible, an Oriental Institute Symposium.*
 1966 *The City in History.*
- MURDOCK, G. P.
 1945 The common denominator of cultures, in Linton, R. (ed.), *The Science of Man in the World Crisis.*
- MYLONAS, G. E.
 1929 *Excavations at Olynthos, Part I. The Neolithic Settlement* (The Johns Hopkins University Studies in Archaeology, 6).
 1959 *Aghios Kosmas, an Early Bronze Age Settlement and Cemetery in Attica.*
 1967 *Ancient Mycenae.*
- MYRES, J. L.
 1930 *Who Were the Greeks?*
 1953 *Geographical History in Greek Lands.*
- NAKOU, G.
 1995 The cutting Edge: A new Look at early Aegean Metallurgy, *Journal of Mediterranean Archaeology* 8, 1-32.
- NASH, M.
 1966 *Primitive and Peasant Economic Systems.*
- NEUBURGER, A.
 1930 *The Technical Arts and Sciences of the Ancients.*
- NEUNINGER, H., PITTIONI, R. AND SIEGL, W.
 1964 Frühkeramikzeitliche Kupfergewinnung in Anatolien. *Archaeologia Austriaca* 35, 98.
- NEUSTUPNY, E.
 1968 Absolute chronology of the Neolithic and Aeneolithic periods in central and south-eastern Europe, *Slovenská Archaeológia* 16, 19.
- NEWTON, R. G. AND RENFREW, C.
 1970 British faience beads reconsidered, *Antiquity* 44, 199.
- NIEMEIER, W.-D. AND LAFFINEUR, R. (EDS.)
 1995 *POLITEIA: State and Society in the Aegean Bronze Age* (Aegaeum 12), Liège, Université de Liège.
- NILSSON, M. P.
 1950 *The Minoan-Mycenaean Religion and its Survival in Greek Religion.*
- NOBLE, J. V.
 1969 The technique of Egyptian faience, *American Journal of Archaeology* 73, 435.
- OAKLEY, K. P.
 1969 Man the skilled tool maker, *Antiquity* 43, 222.
- ÖNAY, T. S.
 1949 Über die Schmirgelsteine S.W. Anatoliens, *Schweizerische Mineralogische und Petrologische Mitteilungen* 29, 357.
- ÖZGÜÇ, T.
 1948 *Die Bestattungsgebräuche im vorgeschichtlichen Anatolien.*
- ÖZGÜÇ, T. AND AKOK, M.
 1958 *Horoztepe.*
- OOSTEROM, M. G.
 1968 Mineralogical investigation of archaeological specimens from Saliagos, in Evans, J. D. and Renfrew, C., *Excavations at Saliagos near Antiparos.*
- ORMEROD, H. A.
 1924 *Piracy in the Ancient World.*
- PAGE, D.
 1959 *History and the Homeric Iliad.*

- PALAIMA, T. G.
2008 Mycenaean Religion, in C. W. Shelmerdine (ed.), *The Cambridge Companion to the Aegean Bronze Age*, Cambridge, Cambridge University Press, 342–61.
- PALMER, L. R.
1963 *The Interpretation of Mycenaean Greek Texts*.
1965 *Mycenaeans and Minoans*.
- PALMER, R.
1994 *Wine in the Mycenaean Palace Economy* (Aegaeum 10), Liège, Université de Liège.
- PANTELIDOU GOFA, M.
2008 The EHI Deposit at Tsepi Marathon: Features, Formation and the Breakage of Finds, in Brodie N. et al. (eds.), 281–90.
- PAPADIMITRIOU, I.
1949 Anaskaphai Asklepeiou Epidauroy, *Praktika tis Archaiologikis Etaireias* 1949.
- PAPADOPOULOU, F.
1965 Archaiotites kai Mnimeia Kykladon, *Archaiologikon Deltion* 20, 508.
- PAPADOPOULOU-ZAPHEIROPOULOU, F.
1966 Archaiotites kai Mnimeia Kykladon, *Archaiologikon Deltion* 21, B'2, 386.
- PAPASTAMATIOU, I.
1951 The emery of Naxos, *The Mineral Wealth of Greece* (Institute for Geology and Subsurface Research, Athens).
- PAPATHANASSOPOULOS, G. A.
1961–62 Kykladika Naxou, *Archaiologikon Deltion* 17, 104.
1996 *Neolithic Culture in Greece*, Athens, Goulandris Foundation.
- PAPAVASILEIOU, G.
1910 *Peri ton en Euboia Archaion Taphon*.
- PARLAMA, L. AND THEOCHARE, M.
in press Palamari Skyrou, schetike kai apolute chronologese ton phaseon tis proimes chalkokratias, in C. Doumas (ed.), *The Aegean Early Bronze Age, New Evidence* (Proceedings of the International Conference, Athens, April 2008), Athens, Archaiologiko Institutou Aigaiakon Spoudon.
- PARTINGTON, J. R.
1935 *The Origins and Development of Applied Chemistry*.
- PATRONI, G.
1895 Sulle antichite di Tenos, *Athenische Mitteilungen* 20, 398.
- PAYNE, J. C.
1968 Lapis lazuli in Early Egypt, *Iraq* 30, 58.
- PAYNE, S.
1968 The origins of domestic sheep and goats – a reconsideration in the light of fossil evidence, *Proceedings of the Prehistoric Society* 34, 368.
- PEARSON, H. W.
1957 The economy has no surplus: critique of a theory of development, in Polanyi, K., Arensberg, C. M. and Pearson, H. W., (eds.), *Trade and Market in the Early Empires*, 320.
- PENDLEBURY, J. D. S.
1930 *Aegyptiaca, a Catalogue of Egyptian Objects in the Aegean Area*.
1939 *The Archaeology of Crete*.
- PENDLEBURY, H. W., PENDLEBURY, J. D. S. AND MONEY-COUTTS, M. B.
1936 Excavations in the Plain of Lasithi. I. The Cave of Trapeza, *Annual of the British School of Archaeology at Athens* 36, 5.
- PENNIMAN, T. K.
1952 *Pictures of Ivory and other Animal Teeth, Bone and Antler* (Pitt Rivers Museum Occasional Papers on Technology, 5).
- PEPERAKI, O.
2004 The House of the Tiles at Lerna: Dimensions of 'social Complexity', in

- J. C. Barrett and P. Halstead (eds.), *The Emergence of Civilisation Revisited*, (Sheffield Studies in Aegean Archaeology 6), Oxford, Oxbow Books, 214–31.
- PERKINS, A. AND WEINBERG, S. S.
1958 Connections of the Greek Neolithic and the Near East, *American Journal of Archaeology* 72, 225.
- PERLÈS, C.
1992 Systems of Exchange and Organization of Production in neolithic Greece, *Journal of Mediterranean Archaeology* 5, 115–64.
2001 *The Early Neolithic in Greece*, Cambridge, Cambridge University Press.
- PERNIER, L. AND BANTI, L.
1951 *Il Palazzo Minoico de Festos II*.
- PERSSON, A.
1942 *New Tombs at Dendra near Midea*.
- PETRIE, W. M. F.
1896 *Naqada and Ballas*.
1899 Sequences in prehistoric remains, *Journal of the Anthropological Institute* 29, 295.
- PETRIE, W. M. F., WAINWRIGHT, G., AND MACKAY, E.
1912 *The Labyrinth of Gerzeh and Mazhguneh*.
- PHILANIOTOU, O.
2008 Naxos, Tsikniades: An Early Cycladic cemetery, in N. Brodie et al. (eds.), *Horizon: A Colloquium on the Prehistory of the Cyclades*, Cambridge, McDonald Institute, 195–208.
- PHILLIPS, A. P.
1967 Comparison of settlement size – the Near East and the Aegean in the neolithic and bronze ages. Unpublished seminar paper, Department of Classics (Section of Indo-European Studies), University of California at Los Angeles, Feb. 1967.
- PHILLIPSON, A.
1959 *Die Griechischen Landschaften*. IV, *Das Ägäische Meer*.
- PIGGOTT, S.
1961 The man-made world, in Piggott, S. (ed.), *The Dawn of Civilisation*, 11.
1968 The earliest wheeled vehicles and the Caucasian evidence, *Proceedings of the Prehistoric Society* 34, 266.
- PILALI-PAPSTERIOU, A. AND PAPEFTHYMIU-PAPANTHIMOU, A.
2002 Die Ausgrabungen auf der Toumba von Archontiko, *Prähistorische Zeitschrift* 77/2, 137–47.
- PINI, I.
1968 *Beiträge zur Minoischen Gräberkunde*.
- PLANHOL, F. X. DE
1954 Limites antique et actuelle des cultures arbustres méditerranéennes en Asie Mineure, *Bulletin de l'Association de Géographes Français* 239 and 240, 4.
- PLASSART, A.
1928 *Les sanctuaires et les cultes du Mont Cynthe* (Exploration archéologique de Délos, XI).
- PLATON, N.
AND STASSINOPOULOU TOULOUPA, E.
1964 Ivories and Linear B tablets from Thebes, *Illustrated London News*, December 5, 1964, 89.
- POLANYI, K.
1957 The economy as instituted process, in Polanyi, K., Arensberg, C. M. and Pearson, H. W. (eds.), *Trade and Market in the Early Empires*, 243.
1960 On the comparative treatment of economic institutions in antiquity with illustrations from Athens, Mycenae and Alalakh, in Kraeling, C. H. and Adams, R. M. (eds.), *City Invincible, an Oriental Institute Symposium*.

- POLLAK, A.
1896 Von griechischen Inseln, *Athenische Mitteilungen* 21, 210.
- POPHAM, M. R. AND SACKETT, L. H.
1968 *Excavations at Lefkandi, Euboia, 1964–66* (British School of Archaeology at Athens).
- POPOVIĆ, V.
1965 Une civilisation égéo-orientale sur le moyen Danube, *Revue Archéologique* Juillet–Septembre 1965, 1.
- POPPER, K. R.
1957 *The Poverty of Historicism*.
- PREZIOSI, P. G.
1966a Cycladic objects in the Fogg and Farland collections, *American Journal of Archaeology* 70, 105.
1966b Early Cycladic sculpture: four aspects. (Unpublished paper, privately circulated.)
- PREZIOSI, P. G. AND WEINBERG, S.
1970 Evidence for the painted details in Early Cycladic sculpture, *Antike Kunst* 13, 4.
- PRYCE, F. N.
1928 *Prehellenic and Early Greek Sculpture* (Catalogue of Sculpture in the Department of Greek and Roman Antiquities in the British Museum I, part 1).
- PUGLIESE-CARRATELLI, G.
1957 Sulle epigrafi in Lineare A di carattere sacrale, *Minos* 5, 163.
- PULLEN, D. J.
1992 Ox and Plough in the Early Bronze Age Aegean, *American Journal of Archaeology* 96, 45–54.
1994 A Lead Seal from Tsoungiza, ancient Nemea and Early Bronze Age Aegean Sealing Systems, *American Journal of Archaeology* 98, 35–52.
2008 The Early Bronze Age in Greece, in C. W. Shelmerdine (ed.), *The Cambridge Companion to the Aegean Bronze Age*, Cambridge, Cambridge University Press, 19–46.
- RAGLAN, LORD
1939 *How came civilisation?*
- RAHMSTORE, L.
2003 The Identification of Early Helladic Weights, in K. P. Foster and R. Laffineur (eds.), *Metron. Measuring the Aegean Bronze Age*. (Aegaeum 24). Liège, Université de Liège, 293–302.
2006 Zur Ausbreitung vorderasiatischer Innovationen in die frühbronzezeitliche Ägäis, *Prähistorische Zeitschrift* 81/1, 49–96.
- RAIKES, R. L.
1965 The Mohenjo-daro floods, *Antiquity* 39, 196.
- RAMBACH, J.
2000a *Kykladen I. Die frühe Bronzezeit, Grab- und Siedlungsbefunde*, Bonn, Habelt.
2000b *Kykladen II. Die frühe Bronzezeit, Frühbronzezeitliche Beigabensittenkreise auf den Kykladen, Relative Chronologie und Verbreitung*, Bonn, Habelt.
- RAPAPORT, R. A.
1967 Ritual regulation of environmental relations among a New Guinea people, *Ethnology* 6, 17.
- RECK, H.
1936 *Santorin: der Werdegang eines Inselvulkanes und sein Ausbruch 1925–1928*.
- REDFIELD, R.
1947 The folk society, *American Journal of Sociology* 52, 293.
1953 *The Primitive World and its Transformations*.
- REISNER, G. A.
1931 Stone vessels found in Crete and Babylonia, *Antiquity* 5, 200.
- RENFREW, C.
1964 Crete and the Cyclades before Rhadamanthus, *Kretika Chronika* 18, 107.
1965 *The Neolithic and Early Bronze Age Cultures of the Cyclades and their*

- External Relations*. Ph.D. dissertation for the University of Cambridge, submitted April 1965, No. 5403.
- 1967a Cycladic metallurgy and the Aegean Early Bronze Age, *American Journal of Archaeology* 71, 1.
- 1967b Colonialism and Megalithism, *Antiquity* 41, 276.
- 1968a Wessex without Mycenae, *Annual of the British School of Archaeology at Athens* 63, 277.
- 1968b Greek Neolithic – backward or precocious? *Current Archaeology* 7, 168.
- 1968c Models in prehistory, *Antiquity* 42, 132.
- 1969a The chronology and classification of the Early Cycladic figurines, *American Journal of Archaeology* 73, 1.
- 1969b The autonomy of the south-east European Copper Age, *Proceedings of the Prehistoric Society* 35, 12.
- 1969c Trace and culture process in European prehistory, *Current Anthropology* 10, 151.
- 1970a The Burnt House at Sitagroi, *Antiquity* 44, 131.
- 1970b New configurations in Old World prehistory, *World Archaeology* 2, 199.
- 1970c The tree-ring calibration of radiocarbon: an archaeological evaluation, *Proceedings of the Prehistoric Society* 36, 280.
- 1970d Problems in the general correlation of archaeological and linguistic strata in prehistoric Greece. Paper presented to the Sheffield Symposium on Bronze Age Migrations in the Aegean, March 1970.
- 1971 Patterns of population growth in the prehistoric Aegean. Paper presented to the Research Seminar on Archaeology and Related Subjects, Three-Day Meeting on Settlement Patterns and Urbanisation, London, December 1970.
- 1973a Problems in the general Correlation of archaeological and linguistic Strata in prehistoric Greece: The model of autochthonous Origin, in R. A. Crossland and A. Birchall (eds.), *Bronze Age Migrations in the Aegean*, London, Duckworth, 263–76.
- 1973b *Before Civilisation, the Radiocarbon Revolution and Prehistoric Europe*, London, Jonathan Cape.
- 1973c *The Explanation of Culture Change: Models in Archaeology*, London, Duckworth.
- 1980 The Great Tradition versus the Great Divide: Archaeology as Anthropology?, *American Journal of Archaeology* 84, 287–98.
- 1985 *The Archaeology of Cult: The Sanctuary at Phylakopi*, London, Thames and Hudson.
- 1986 *Towards an Archaeology of Mind* (Inaugural Lecture), Cambridge, Cambridge University Press.
- 1987, *Archaeology and Language, the Puzzle of Indo-European Origins*, London, Jonathan Cape.
- 1991 *The Cycladic Spirit*, New York, Harry Abrams.
- 1994 Who were the Greeks? A Problem of Ethnicity, in G. B. Peterson (ed.), *The Tanner Lectures on Human Values* 15, Salt Lake City, University of Utah Press, 317–48.
- 1995 'Ever in Process of Becoming': The Autochthony of the Greeks, in J. A. Koumoulides (ed.), *The Good Idea, Democracy in Ancient Greece*, New Rochelle, Caratzas, 7–28.
- 1998a Mind and Matter: Cognitive Archaeology and external symbolic Storage, in C. Renfrew and C. Scarre (eds.), *Cognition and Material Culture: The Archaeology of Symbolic Storage*, Cambridge, McDonald Institute, 1–6.
- 1998b Word of Minos, the Minoan Contribution to Mycenaean Greek and the linguistic Geography of the Bronze Age Aegean, *Cambridge Archaeological Journal* 8, 239–64.
- 1999a Time Depth, Convergence Theory and Innovation in Proto-Indo-European:

- 'Old Europe' as PIE linguistic Area, *Journal of Indo-European Studies* 27, 257–93.
- 1999b The Loom of Language and the Versailles Effect, in P. L. Betancourt, V. Karageorghis, R. Laffineur and W.-D. Niemeier (eds.), *MELETEMATATA, Studies in Aegean Archaeology Presented to Malcolm H. Wiener* (Aegaeum 20), Liège, Université de Liège, 711–20.
- 2000, *Loot, Legitimacy and Ownership: The Ethical Crisis in Archaeology*, London, Duckworth.
- 2001 Symbol before Concept: Material Engagement and the early Development of Society, in I. Hodder (ed.), *Archaeological Theory Today*, Cambridge, Polity Press, 122–40.
- 2003 Special Clay Objects: Cylinders, Stamp Seals, Counters, Biconoids and Spheres, in E. S. Elster and C. Renfrew (eds.), *Prehistoric Sitagroi: Excavations in Northern Greece, 1968–1970. Volume 2: The Final Report*, (Monumenta Archaeologica 20), Los Angeles, Cotsen Institute of Archeology at UCLA, 403–19.
- 2004 Towards a Theory of material Engagement, in E. DeMarrais, C. Gosden and C. Renfrew (eds.), *Rethinking Materiality: The Engagement of Mind with the material World*, Cambridge, McDonald Institute, 23–32.
- 2006 *I Anadyse tou Poltismou, Oi Kyklades kai to Aigaio stin 3e chilia etia p. Ch.*, Athens, Morphotiko Idryma tes Ethnikes Trapezas.
- RENFREW, C. (ED.)
- 2007 *Excavations at Phylakopi in Melos 1974–77*, (BSA Supplementary Volume 42) London, British School at Athens.
- RENFREW, C. AND ASPINALL, A.
- 1990 Aegean Obsidian and Franchthi Cave, in C. Perlès, *Les industries taillées de Franchthi (Argolide, Grèce), 2: Les industries du mésolithique et du néolithique initial* (Excavations at Franchthi Cave, Greece, Fascicle 5), Bloomington, Indiana University Press, 257–70.
- RENFREW, C., CANN, J. R. AND DIXON, J. E.
- 1965 Obsidian in the Aegean, *Annual of the British School of Archaeology at Athens* 60, 225.
- RENFREW, C. AND CHERRY, J. F. (EDS.)
- 1986 *Peer Polity Interaction and Sociopolitical Change*, Cambridge, Cambridge University Press.
- RENFREW, C., DOUMAS, C., MARANGO, L. AND GAVALAS, G. (EDS.)
- 2007 *Keros, Dhaskalio Kavos, the Investigations of 1987–88*, Cambridge, McDonald Institute.
- RENFREW, C. AND EVANS, R. K.
- 2007 The Early Bronze Age Pottery, in C. Renfrew (ed.), *Excavations at Phylakopi in Melos 1974–77*, 129–80.
- RENFREW, C., GIMBUTAS, M. AND ELSTER, E. S. (EDS.)
- 1986 *Excavations at Sitagroi, a Prehistoric Village in Northeast Greece I*, Los Angeles, University of California.
- RENFREW, C., HOUSELY, R. AND MANNING, S.
- 2006 The absolute Dating, in Marangou et al. (eds.), *Markiani, Amorgos: An Early Bronze Age Fortified Settlement* (BSA Supplementary Volume 10), London, British School at Athens, 71–80.
- RENFREW, C. AND PEACEY, J. S.
- 1968 Aegean marble, a petrological study, *Annual of the British School of Archaeology at Athens* 63, 45.
- RENFREW, C., PHILANIOTOU, O., BRODIE, N. AND GAVALAS, G.
- 2007 Keros: Dhaskalio and Kavos, Early Cycladic Stronghold and ritual Centre. Preliminary Report of the 2006 and

- 2007 Seasons. *Annual of the British School at Athens* 102, 103–36.
- 2009 The Early Cycladic Settlement at Dhaskalio Kavos: Preliminary Report of the 2008 Excavation Season, *Annual of the British School at Athens*, 104, 27–47.
- RENFREW, C. AND SLATER, E.
- 2003 Metal Artifacts and Metallurgy, in E. S. Elster and C. Renfrew (eds.), *Prehistoric Sitagroi, Excavations in Northeast Greece 1968–1970, Volume 2: The Final Report* (Monumenta Archaeologica 20), Los Angeles, Cotsen Institute of Archaeology at UCLA, 301–24.
- RENFREW, C. AND STERUD, G.
- 1969 Close proximity analysis: a rapid method for the ordering of archaeological materials, *American Antiquity* 34, 265–77.
- RENFREW, C. AND WAGSTAFF, M. (EDS.)
- 1982 *An Island Polity, the Archaeology of Exploitation in Melos*, Cambridge, Cambridge University Press.
- RENFREW, J. M.
- 1966 A report on recent finds of carbonized cereal grains and seeds from prehistoric Thessaly, *Thessalika* 5, 22.
- 1969a The archaeological evidence for the domestication of plants: methods and problems, in Ucko, P. and Dimbleby, G. W. (eds.), *The Domestication and Exploitation of Plants and Animals*.
- 1969b Palaeoethnobotany and the Neolithic Period in Greece and Bulgaria. Unpublished Ph.D. dissertation, University of Cambridge.
- 1973 *Palaeoethnobotany: The Prehistoric Food Plants of the Near East and Europe*, London, Methuen.
- 2003 Grains, Seeds and Fruits from prehistoric Sitagroi, in E. S. Elster and C. Renfrew (eds.), *Prehistoric Sitagroi, Excavations in Northeast Greece 1968–1970, Volume 2: The Final Report*, 3–28.
- REUSCH, H.
- 1958 Zum Wandschmuck des Thronsaales in Knossos, in Grumach, E. (ed.), *Minoica, Festschrift zum 80. Geburtstag von Johannes Sundwall*.
- ROBINSON, H. S. AND WEINBERG, S. S.
- 1960 Excavations at Corinth, 1959, *Hesperia* 29, 225.
- RODDEN, R. J.
- 1962 Excavations at the Early Neolithic site at Nea Nikomedeia, Greek Macedonia, 1961 Season, *Proceedings of the Prehistoric Society* 28, 267.
- 1964a A European link with Chatal Hüyük: uncovering a 7th millennium settlement in Macedonia. Part I. pottery, *Illustrated London News* 1964, 564; Part II. *Illustrated London News* 1964, 604.
- 1964b Recent discoveries from prehistoric Macedonia, *Balkan Studies* 5, 109.
- 1965 An early neolithic village in Greece, *Scientific American*, April 1965, 83.
- 1970 The early neolithic of Greece, pattern and process. Paper delivered to the Annual Conference of the Prehistoric Society, March 1970.
- ROGERS, E. M.
- 1962 *Diffusion of Innovations*.
- ROLFE, J. C.
- 1890 Discoveries at Anthedon in 1889, *American Journal of Archaeology* 6, 104.
- ROSS, L.
- 1840 *Reisen auf griechischen Inseln des ägäischen Meeres*.
- 1842 Vorgriechische Gräber, *Archäologische Aufsätze* I.
- ROSTOW, W. W.
- 1953 *The Process of Economic Growth*.
- ROSTOW, W. W. (ED.)
- 1963 *The Economics of Take-off into Sustained Growth*.

RUBENSOHN, O.

- 1917 Die prähistorischen und frühgeschichtlichen Funde auf dem Burghügel von Paros, *Athenische Mitteilungen* 42, 1.
 1949 Paros, *Pauly-Wissowa Real Encyclopädie der Klassischen Altertumswissenschaft* 18, 1782.

RUNNELS, C.

- 1995 Review of Aegean Prehistory IV: The Stone Age of Greece from the Palaeolithic to the Advent of the Neolithic, *American Journal of Archaeology* 99, 699–728.

RUTTER, J. B.

- 1979 *Ceramic Change in the Aegean Early Bronze Age: the Kastri Group, Lefkandi I and Lerna IV: A Theory concerning the Origin of Early Helladic III Ceramics*, Los Angeles, Cotsen Institute of Archaeology at UCLA.
 1984 The Early Cycladic III Gap: What it is and how to go about filling it without making it go away, in J. A. MacGillivray and R. L. N. Barber (eds.), *The Prehistoric Cyclades: Contributions to a Workshop on Cycladic Chronology*, Edinburgh, Department of Classical Archaeology, 95–107.

RYDER, M. L.

- 1965 Report on textiles from Çatal Hüyük, *Anatolian Studies* 15, 175.

SACKETT, L. H., HANKEY, V., HOWELL, R. J., JACOBSEN, T. W. AND POPHAM, M.

- 1967 Prehistoric Euboea: contributions towards a survey, *Annual of the British School of Archaeology at Athens* 61, 33.

SÄFLUND, G.

- 1965 *Excavations at Berbati 1936–37* (Stockholm Studies in Classical Archaeology).

SAHLINS, M. D.

- 1960 Political Power and the Economy in Primitive Society, in Dale, G. E. and Carneiro, R. L. (eds.), *Essays on the Science of Culture: in honour of Leslie A. White*.

- 1965 On the sociology of primitive exchange, in Gluckman, M. and Egan, F. (eds.), *The Relevance of Models for Social Anthropology* (A.S.A. Monographs 1).

1968 *Tribesmen*.

ŞAHOĞLU, V.

- 2005 The 'Anatolian Trade Network' and the Izmir Region during the Early Bronze Age, *Oxford Journal of Archaeology* 24, 339–61.

SAKELLARIOU-XENAKI, A.

- 1961–62 Ta sphragismata tis Lernas kai to provlema ton scheseon tous me tin Kriti, *Kretika Chronika* 15–16, 79.
 1964 *Die Minoischen und Mykenischen Siegel des Nationalmuseums in Athen* (Corpus der Minoischen und Mykenischen Siegel I).

SAMPSON, A.

- 2002 *The Neolithic Settlement at Ftelia, Mykonos, Rhodes*, University of the Aegean: Department of Mediterranean Studies.

SAMPSON, A. AND FOTIADI, P.

- 2008 The Early Cycladic II–III finds from Rivari, Melos, in N. Brodie et al. (eds.), 217–24.

SANDERS, N. K.

- 1955 The antiquity of the one-edged bronze knife in the Aegean, *Proceedings of the Prehistoric Society* 21, 174.
 1961 The earliest Aegean swords and their ancestry, *American Journal of Archaeology* 65, 17.
 1963 Later Aegean bronze swords, *American Journal of Archaeology* 67, 117.

SANTA OLALLA, J. O. M.

- 1946 *Esquema paleontológico de la Peninsula Hispanica*.
 1948 *Quadernos de Historia primitiva* III, 37.

SAPIR, E.

- 1921 *Language*.

- SAYCE, A. H.
1887 The inscriptions found at Hissarlik, Appendix III in Schliemann, H., 1880, *Ilios*.
- SCHACHERMEYR, F.
1955 *Die ältesten Kulturen Griechenlands*.
1962 Forschungsbericht über die Ausgrabungen und Neufunde zur ägäischen Frühzeit 1957–1960, *Archäologischer Anzeiger* 1962, 105.
1964 *Die minoische Kultur des alten Kreta*.
1967 *Ägäis und Orient* (Österreichische Akademie der Wissenschaften, Philologisch-Historische Klasse, Denkschriften, 93).
- SCHIEK, S. AND FISCHER, F.
1965 Einige frühbronzezeitliche Funde aus Kleinasien, *Fundberichte aus Schwaben* 17 (Festschrift Gustav Riek), 156.
- SCHLIEMANN, H.
1880 *Ilios, The County and City of the Trojans*.
- SCHMIDT, H.
1902 *Heinrich Schliemann's Sammlung trojanischer Altertümer*.
1903 Tordoš, *Zeitschrift für Ethnologie* 1903, 438.
- SCHOLES, K.
1956 The Cyclades in the later Bronze Age: a synopsis, *Annual of the British School of Archaeology at Athens* 51, 9.
- SCHULZE-WESTRUM, T.
1963 Die Wildziegen der ägäischen Inseln, *Säugetierkundliche Mitteilungen* II, 4, 145.
- SEAGER, R. B.
1907 Report of excavations at Vasiliki, Crete, in 1906, *Transactions of the Free Museum of Science and Art, University of Pennsylvania* 2, 111.
1912 *Explorations in the Island of Mochlos*.
1916 The cemetery of Pachyammos, Crete, *Anthropological Publications of the University Museum, University of Pennsylvania* 7, No. 1.
- SEGALL, B.
1938 *Museum Benaki. Katalog der Goldschmiede-Arbeiten*.
- SELMKHOV, I. R.
1962 Spectral analyses of metal articles from archaeological monuments, *Proceedings of the Prehistoric Society* 28, 68.
- SEMPLE, E. C.
1932 *The Geography of the Mediterranean Region, its Relation to Ancient History*.
- SERVAIS, J.
1965 Les fouilles sur le haut du Velatouri, *Thorikos* III, 9–30.
- SERVICE, E. R.
1962 *Primitive Social Organisations*.
1968 *The Hunters*.
- SHACKLETON, N. J. AND RENFREW, C.
1970 Neolithic trade routes realigned by oxygen isotope analysis, *Nature* 228, 1062.
- SHEAR, T. L.
1936 The campaign of 1935, *Hesperia* 5, 20.
- SHELMERDINE, C. W.
1997 Review of Aegean Prehistory VI: The palatial Bronze Age of the southern and central Greek Mainland, *American Journal of Archaeology* 101, 537–585.
- SHELMERDINE, C. W. (ED.)
2008 *The Cambridge Companion to the Aegean Bronze Age*, Cambridge, Cambridge University Press.
- SHELMERDINE, C. W. AND BENNET, J.
2008 Mycenaean States: Economy and Administration, in C. W. Shelmerdine (ed.), *The Cambridge Companion to the Aegean Bronze Age*, Cambridge, Cambridge University Press, 289–30.

SHERRATT, A.

- 1993 What would a Bronze Age World System look like? Relations between temperate Europe and the Mediterranean in later Prehistory, *Journal of European Archaeology* 1, 1–58.

SINGER, C. L., HOLMYARD, E. J.

AND HALL, A. R. (EDS.)

- 1954 *A History of Technology*, Vol. 1.

SIRET, L.

- 1913 *Questions de Chronologie et d'Ethnographie Ibériques*.

SKIAS, A. N.

- 1902 Tumbos proistorikos upo tin Akropolin, *Archaïologike Ephemeris* 1902, 123.

SMITH, D. M., AND OTHERS

- 1966 *The Selinion Region of south-west Crete*.

SMITH, H. S.

- 1964 Egypt and C14 dating, *Antiquity* 38, 32.

SMITH, S.

- 1945 Middle Minoan I–II and Babylonian chronology, *American Journal of Archaeology* 49, 1.

SMITH, W. S.

- 1965 *Interconnections in the Ancient Near East*.

SOKAL, R. R. AND SNEATH, P. H. A.

- 1963 *Principles of Numerical Taxonomy*.

SORDINAS, G.

- 1970 *Stone implements from north-western Corfu, Greece* (Memphis State University Anthropological Research Center Occasional Papers 4).

SOTERIADES, G.

- 1908 Proistorika angeia Chaironeias kai Elateias, *Ephemeris Archaïologike* 1908, 63.
1912 Fouilles préhistoriques en Phocide, *Revue des Études Grecques* 25, 253.

SOTIRAKOPOULOU, P.

- 1993 The Chronology of the 'Kastri group' reconsidered, *Annual of the British School of Archaeology at Athens* 88, 5–20.
1998 The Early Bronze Age Stone Figurines from Akrotiri on Thera and their Significance for the Early Cycladic Settlement, *Annual of the British School at Athens* 93, 107–65.
1999 *Akrotiri Thiras, I Neolithiki kai i Proimi Epoche tou Chalkou epi ti Basei tis Kerameikis*, Athens, Archaïologike Etaireia.
2005 *The 'Keros Hoard': Myth or Reality? Searching for the Lost Pieces of a Puzzle*. Athens, N. P. Goulandris Museum of Cycladic Art.

SOUVATZI, S. G.

- 2008 *A Social Archaeology of Households in Neolithic Greece*, Cambridge, Cambridge University Press.

STAMP, L. D.

- 1965 *Land use statistics of the countries of Europe* (World Land Use Survey Occasional Papers 3).

STARR, C. G.

- 1955 The Minoan thalassocracy re-examined, *Historia* 3, 282.

STEPHANOS, K.

- 1903 Kykladika Naxou, *Praktika tis Archaïologikis Etaireias* 1903, 52; 1904, 57; 1908, 114; 1909, 209; 1910, 270; 1911, 357.
1905 Les tombeaux prémycéniens de Naxos, *Comptes Rendus du Ier Congrès International d'Archéologie*, Athènes, 1905, 216.

STEWART, J. H.

- 1949 Cultural causality and law: a trail formulation of the development of early civilisations, *American Anthropologist* 51, 1.
1955 *Theory of Cultural Change*.

- STONE, J. F. S. AND THOMAS, L. C.
1956 The use and distribution of faience in the Ancient Near East and Prehistoric Europe, *Proceedings of the Prehistoric Society* 22, 37.
- STOS-GALE, Z. A., GALE, N. H.
AND GILMORE, G. R.,
1984 Early Bronze Age Trojan Metal Sources and Anatolians in the Cyclades, *Oxford Journal of Archaeology* 3, 23-43.
- STRONACH, D.
1957 Metal types in Early Bronze Age Anatolia, *Anatolian Studies* 7, 89.
- STRONG, D. E.
1966 *Greek and Roman Silver Plate*.
- STUBBINGS, F. H.
1951 *Mycenaean Pottery from the Levant*.
- SUESS, H.
1967 Bristlecone Pine calibration of the Radiocarbon time scale from 4100 B.C. to 1500 B.C., *Radioactive Dating and Methods of Low Level Counting* (International Atomic Energy Agency, Vienna), 143.
- SULZE, H.
1958 Die Zimmermannsarbeit der mykenischen Bauten, in Grumach, E. (ed.), *Minoica, Festschrift zum 80. Geburtstag von Johannes Sundwall*, 394.
- TARAMELLI, A.
1897 The prehistoric grotto of Miami, *American Journal of Archaeology* 1, 287.
- TAYLOUR, W. D.
1958 *Mycenaean Pottery in Italy*.
1964 *The Mycenaeans*.
- TELEVANTOU, C. A.
2008a Strofilas: A neolithic Settlement on Andros, in N. Brodie et al. (eds.), *Horizon: A Colloquium on the Prehistory of the Cyclades*, Cambridge, McDonald Institute, 43-54.
- 2008b The Early Cycladic Cemetery at Rivari on Melos, in N. Brodie et al. (eds.), *Horizon: A Colloquium on the Prehistory of the Cyclades*, Cambridge, McDonald Institute, 209-16.
- TEZCAN, B.
1960 New finds from Horoztepe, *Anatolia* 5, 29.
- THEOCHARIS, D.
1945 Proistorikai erevnai eh Skyro kai Eubolia, *Archaeologike Ephemeris* 1942-45 (Chronika).
1951 Anaskaphai en Araphini, *Praktika tis Archaiologikis Etaireias* 1951, 77.
1952a Anaskaphai en Palaia Kokkinia Piraia, *Praktika tis Archaiologikis Etaireias* 1952, 93.
1952b Fouilles - Raphina, *Praktika tis Archaiologikis Etaireias* 1952, 129.
1953 Fouilles - Raphina, *Praktika tis Archaiologikis Etaireias* 1953, 105.
1954a Askitaro, *Archaeologike Ephemeris* 1953-54, Part III.
1954b Anaskaphe en Araphini, *Praktika tis Archaiologikis Etaireias* 1954, 104.
1955a Neoi 'Kykladikoi' taphoi en Attiki, *Neon Athenaion* 1, 283.
1955b Anaskaphe en Araphini, *Praktika tis Archaiologikis Etaireias* 1955, 109.
1956 Nea Makri. Eine grosse neolithische Siedlung in der Nähe von Marathon, *Athenische Mitteilungen* 71, 1.
1958 Ek tis prokerameikis Thessalias, *Thessalika* 1, 70.
1959a Ek tis proistorias tis Euboiias kai tis Skyrou, *Archaion Euboikon Meleton* 1959, 279.
1959b Pyrasos, *Thessalika* 2, 29.
1967 *I Avgi tis Thessalikis Proistorias*.
1981 *Neolithic Greece*, Athens, National Bank of Greece.
- THIMME, J. AND GETZ-PREZIOSI, P. (EDS.)
1977 *Art and Culture of the Cyclades*, Karlsruhe, Badisches Landesmuseum.

- TOD, M. N.
1902 Hagios Nikolaos, *Annual of the British School of Archaeology at Athens* 9, 336.
- TODOROVIĆ, J. AND CERMANOVIĆ, A.
1961 *Banjica, Siedlung der Vinča-Gruppe*.
- TOMKINS, P.
2004 Filling in the 'Neolithic Background': Social Life and social Transformation in the Aegean before the Bronze Age, in J. C. Barrett and P. Halstead (eds.), *The Emergence of Civilisation Revisited*, (Sheffield Studies in Aegean Archaeology 6), Oxford, Oxbow Books, 38–63.
- TORRENCE, R.
1986 *Production and Exchange of Stone Tools: Prehistoric Obsidian in the Aegean*, Cambridge, Cambridge University Press.
- TOULOUPA, E.
1964 Archaeologikai erevnai entos tis poleos ton Thevon, *Archaiologikon Deltion* 19, B'2, 192.
- TRIPATHI, D. N.
1988 *Bronzework of Mainland Greece from c. 2600 BC to c. 1450 BC*, Göteborg, Paul Åströms Förlag.
- TSAKOS, K.
1967 Archaiotites kai mnimeia Samou kai Kykladon, *Archaiologikon Deltion* 22, 464.
- TSIPOPOULOU, M. AND WEDDE, M.
in press The Transformation of Minoan Petras: From Prepalatial to Protopalatial, in C. Doumas (ed.), *The Aegean Early Bronze Age, New Evidence* (Proceedings of the International Conference, Athens, April 2008), Athens, Archaiologiko Institutouto Aigaiakon Spoudon.
- TSOUNTAS, C.
1898 Kykladika I, *Archaiologike Ephemeris* 1898, 137.
- 1899 Kykladika II, *Archaiologike Ephemeris* 1899, 73.
- 1908 Ai Proistorikai Akropoleis Dhiminiou kai Sesklou.
- TURRILL, W. B.
1929 *The Plant Life of the Balkan Peninsula*.
- TUSTIN, A.
1953 *The Mechanism of Economic Systems*.
- TYLECOTE, R. F.
1962 *Metallurgy in Archaeology*.
- UCKO, P. J.
1968 *Anthropomorphic Figurines of Pre-dynastic Egypt and Neolithic Crete* (Royal Anthropological Institute Occasional Paper, 24).
- 1969 Ethnography and archaeological interpretation of funerary remains, *World Archaeology* 1, 262.
- VALMIN, M. N.
1938 *The Swedish Messenia Expedition* (Skrifter Utgivna av Kungl. Humanistiska Vetenskapssamfundet i Lund, 26).
- 1939 *Das adriatische Gebiet in Vor- und Frühbronzezeit* (Lunds Universitets Årsskrift, N.F., Avd. 1, Bd. 35. 1).
- VAN ANDEL, T. H. AND RUNNELS, C. N.
1988 An Essay on the 'Emergence of Civilization' in the Aegean World, *Antiquity* 62, 234–47.
- VAN DER HAMMEN, T., WIJMSTRA, T. A. AND VAN DER MOLEN, W. H.
1965 Palynological study of a very thick peat section in Greece and the Würm-glacial vegetation in the Mediterranean region, *Geologie en Mijnbouw* 44, 37.
- VAROUCHEA, I. A.
1926 Kykladikoi taphoi tis Parou, *Archaeologike Ephemeris* 1926, 98.
- VATIN, C.
1965 Délos prémycénien, *Bulletin de Correspondance Hellénique* 89, 225.

- VEBLEN, T.
1925 *The Theory of the Leisure Class*.
- VENTRIS, M. AND CHADWICK, J.
1956 *Documents in Mycenaean Greek*.
- VERCOUTTER, J.
1954 *Essai sur les Relations entre Égyptiens et Préhellènes*.
- VERHOOGEN, E.
1930 *Bulletin des Musées Royaux d'Art et d'Histoire (Brussels)* 3rd Ser., I, 23.
- VERMEULE, E.
1964a *Greece in the Bronze Age*.
1964b The Early Bronze Age in Caria, *Archaeology* 17, 244.
- VICKERY, K. F.
1936 *Food in Early Greece* (Illinois Studies in the Social Sciences, 20, 3).
- VLASSA, N.
1963 Chronology of the neolithic in Transylvania in the light of the Tartaria settlement stratigraphy. *Dacia* 7, 1.
- VOUTSAKI, S.
1995 Social and political Processes in the Mycenaean Argolid: The Evidence from mortuary Practices, in W.-D. Niemeier and R. Laffineur (eds.), *POLITEIA: Society and State in the Aegean Bronze Age* (Aegaeum 12), Liège, Université de Liège, 55–66.
- WACE, A. J. B.
1932 Excavations at Mycenae, *Annual of the British School of Archaeology at Athens* 25, 1.
1932 Chamber tombs at Mycenae, *Archaeologia* 82.
1949 *Mycenae*.
1953 Mycenae 1939–1952, *Annual of the British School of Archaeology at Athens* 48, 3.
- WACE, A. J. B. AND BLEGEN, C. W.
1916–18 The pre-Mycenaean pottery of the mainland, *Annual of the British School of Archaeology at Athens* 22, 179.
- 1939 Pottery as evidence for trade and colonisation in the Aegean Bronze Age, *Klio* 32, 131.
- WACE, A. J. B. AND THOMPSON, M. S.
1912 *Prehistoric Thessaly*.
- WARREN, P. M.
1965 The first Minoan stone vases and Early Minoan chronology, *Kretika Chronika* 19, 7.
1967a Minoan stone vases as evidence for Minoan foreign connections in the Aegean Late Bronze Age, *Proceedings of the Prehistoric Society* 33, 37.
1967b A stone vase-maker's workshop in the Palace at Knossos, *Annual of the British School of Archaeology at Athens* 62, 195.
1968 A textile town – 4500 years ago? *Illustrated London News*, February 7, 1968, 25.
1969a An early bronze age potter's workshop in Crete, *Antiquity* 43, 224.
1969b *Minoan Stone Vases*.
1969c Minoan village on Crete, *Illustrated London News*, February 8, 1969, 26.
1970a Early Minoan Crete in the light of recent discovery. Paper delivered to the Annual Conference of the Prehistoric Society, March 1970.
1970b The primary dating evidence for Early Minoan seals, *Kadmos* 9, 29.
1972 *Myrtos: An Early Bronze Age Settlement on Crete*, London, Thames and Hudson.
1975 *The Aegean Civilisations*, London, Elsevier Phaidon.
- WARREN, P. M. AND HANKEY, V.
1989 *Aegean Bronze Age Chronology*, Bristol, Bristol Classical Press.
- WATERHOUSE, H.
1956 Prehistoric Laconia, *Annual of the British School of Archaeology at Athens* 51, 168.

- WATERHOUSE, H.
AND HOPE-SIMPSON, R.
1960 Prehistoric Laconia, Part I, *Annual of the British School of Archaeology at Athens*, 55, 67.
1961 Prehistoric Laconia, Part II, *Annual of the British School of Archaeology at Athens* 56, 114.
- WEINBERG, S. S.
1937 Remains from prehistoric Corinth, *Hesperia* 6, 487.
1942 The chronology of the Neolithic period and the Early Bronze Age in the Aegean, *American Journal of Archaeology* 46, 121.
1947 Aegean chronology: Neolithic period and Early Bronze Age, *American Journal of Archaeology* 51, 165.
1951 Neolithic figurines and Aegean interrelations, *American Journal of Archaeology* 55, 121.
1954 The relative chronology of the Aegean in the Neolithic period and the Early Bronze Age, in Ehrich, R. W. (ed.), *Relative Chronologies in Old World Archaeology*, 86.
1961 Halafian and Ubaidian influence in Neolithic Greece, *Bericht über den V. Internationalen Kongress für Vor- und Frühgeschichte, Hamburg*, 858.
1962 Excavations at prehistoric Elateia, 1959, *Hesperia* 31, 158.
1965a The Stone Age in the Aegean, *Cambridge Ancient History* I, Ch. 10.
1965b The relative chronology of the Aegean in the Stone and Early Bronze Ages, in Ehrich, R. W. (ed.), *Relative Chronologies in Old World Archaeology*, 285.
1965c Ceramics and the supernatural – Cult and burial evidence in the Aegean world, *Ceramics and Man* (Viking Fund Publications in Anthropology, 41).
- WEINGARTEN, J.
1987 Another Look at Lerna: An EHIIB Trading Post?, *Oxford Journal of Archaeology* 16, 147–66.
- WELTER, G.
1937 Aiginetische Keramik, *Archäologischer Anzeiger* 1937, 19.
1938 *Aigina*.
1954 Von griechischen Inseln: I. Keos, *Archäologischer Anzeiger* 1954, 64.
- WERTIME, T. A.
1964 Man's first encounters with metallurgy, *Science* 146, 1257.
- WHEELER, R. E. M.
1954 *Archaeology from the Earth*.
- WHITE, L. A.
1959 *The Evolution of Culture*.
- WHITELAW, T. M.
1983 The Settlement at Fournou Korifi, Myrtos, and Aspects of Early Minoan social Organisation, in Krzyszkowska O. H. and Nixon L. (eds.), *Minoan Society: Proceedings of the Cambridge Colloquium 1981*, Bristol, Bristol Classical Press, 323–45.
1994 The Early Minoan Household: Methods and Tools for Analysis, *American Journal of Archaeology* 98, 335–36.
2004 The Development of an Island Centre: Urbanization at Phylakopi on Melos, in J. Cherry, C. Scarre and S. Shennan (eds.), *Explaining Social Change: Studies in Honour of Colin Renfrew*, Cambridge, McDonald Institute, 149–66.
- WHITLEY, J.
1991 *Style and Society in Dark Age Greece*, Cambridge, Cambridge University Press.
- WIENCKE, M. H.
1969 Further seals and sealings from Lerna, *Hesperia* 38, 502.
1970 Banded pithoi of Lerna III, *Hesperia* 39, 94.
- WIENER, N.
1948 *Cybernetics*.

- WILSON, D. E.
1999 *Keos IX.I. Ayia Irini, Periods I to III. The Neolithic and Early Bronze Age Settlements. Part I. The Pottery and Special Finds*. Mainz, von Zabern.
- WILSON, D. E., DAY, P. M. AND DIMOPOULOU-RETHEMIOTAKI, N.
2008 The Gateway Port of Poros-Katsambas: Trade and Exchange between north-central Crete and the Cyclades in EBI-II, in Brodie N. et al. (eds.), 271–80.
- WITTFOGEL, K. A.
1957 *Oriental Despotism, a Study of Total Power*.
- WITTMACK, L.
1890 Samen aus den Ruinen von Hissarlik, *Zeitschrift für Ethnologie* 22.
- WOLF, E. R.
1966 *Peasants*.
1967 Understanding civilisations, *Comparative Studies in Society and History* 9, 446.
- WOLTERS, P.
1891 Marmorkopf aus Amorgos, *Athenische Mitteilungen* 16, 46.
1898 Prähistorische Idole aus Blei, *Athenische Mitteilungen* 23, 462.
1900 Prähistorische Idole aus Blei, *Athenische Mitteilungen* 25, 339.
- WRIGHT, H. E.
1968 Climatic change in Mediterranean Greece, *Antiquity* 42, 123.
- WRIGHT, J. C.
1995 From Chief to King in Mycenaean Greece, in Rehak P. (ed.), *The Role of the Ruler in the Prehistoric Aegean* (Aegaeum 11), Liège, Université de Liège, 63–84.
2004a The Emergence of Leadership and the Rise of Civilization in the Aegean, in J. C. Barrett and P. Halstead (eds.), *The Emergence of Civilisation Revisited*, (Sheffield Studies in Aegean Archaeology 6), Oxford, Oxbow Books, 64–89.
- WRIGHT, J. C. (ED.)
2004b *The Mycenaean Feast*, Princeton, American School of Classical Studies at Athens.
- WRIGHT, J. C., CHERRY, J. F., DAVIS, J., MANTZOURANI, E. AND SUTTON, S.
1990 The Nemea Valley Archaeological Project, 1984–87: A preliminary Report, *Hesperia* 59, 579–659.
- WYNNE-EDWARDS, V. C.
1962 *Animal Dispersion in Relation to Social Behaviour*.
- XANTHOUDIDES, S. A.
1918 Megas protominoikos taphos Pyrgou, *Archaiologikon Deltion* 4, 136.
1924 *The Vaulted Tombs of the Mesara*.
1927 Some Minoan potter's wheel discs, in Casson, S. (ed.), *Essays in Aegean Archaeology presented to Sir Arthur Evans*, 111.
- YALOURIS, N.
1957 Dokimastikai erevnai eis ton kolpon tis Pheias Eleias, *Ephemeris Archaialogike* 1957, 31.
- YOUNG, D.
1965 Some puzzles about Minoan woolgathering, *Kadmos* 4, 111.
- ZACHOS, K. L.
1987 Naxos, Spelaio Za, *Archaiologikon Deltion* 42, B2, Chronika, 694–700.
1996 Metallurgy, in G. A. Papathanassopoulos (ed.), *Neolithic Culture in Greece*, Athens, Goulandris Foundation, 166–67.
1999 Zas Cave on Naxos and the Role of Caves in the Aegean Late Neolithic, in P. Halstead (ed.), *Neolithic Society in Greece*, Sheffield, Sheffield Academic Press.
2007 The neolithic Background, a Reassessment, in P. M. Day and R. C. P. Doonan (eds.), *Metallurgy in the Early Bronze Age Aegean* (Sheffield Studies in Aegean Archaeology 7), Oxford, Oxbow Books, 168–206.

ZACHOS, K. L. AND DOUSOUGLI, A.

- 2008 Observations on the Early Bronze Age Sealings from the Cave of Zas at Naxos, in N. Brodie et al. (eds.), *Horizon: A Colloquium on the Prehistory of the Cyclades*, Cambridge, McDonald Institute, 85–96.

ZAPHEIROPOULOS, N.

- 1960 Kyklades, *Archaiologikon Deltion* 61, 244.
1965 Archaiotites kai Mnimeia Kykladon, *Archaiologikon Deltion* 20, 505.

ZAPHEIROPOULOU, PH.

- 1967 Archaiotites kai Mnimeia Samou kai Kykladon, *Archaiologikon Deltion* 22, 464.
1968a Archaiotites kai Mnimeia Samou kai Kykladon, *Archaiologikon Deltion* 23, 381.
1968b Cycladic finds from Keros, *Athens Annals of Archaeology* 1, 97.
1969 A prehistoric house model from Melos, *Athens Annals of Archaeology* 2, B, 406.
1970 Protokykladika evrymata ex Ano Kouphonisi, *Athens Annals of Archaeology* 3, 48–51.
1984 The Chronology of the Kampos Group, in J. A. MacGillivray and R. L. N. Barber (eds.), *The Prehistoric Cyclades: Contributions to a Workshop on Cycladic Chronology*, Edinburgh, Department of Classical Archaeology, 31–40.

- 2008 Early Bronze Age Cemeteries of the Kampos Group on Ano Kouphonisi, in N. Brodie et al. (eds.), *Horizon: A Colloquium on the Prehistory of the Cyclades*, Cambridge, McDonald Institute, 183–94.

ZERVOS, C.

- 1956 *L'Art de la Crète Néolithique et Minoenne*.
1957 *L'art des Cyclades du Début à la Fin de l'Âge du Bronze, 2500–1100 avant notre Ère*.
1962–63 *Naissance de la Civilisation en Grèce*.

ZIEBARTH, E.

- 1929 *Beiträge zur Geschichte des Seeraubs und Seehandels im Alten Griechenland*.

ZIPE, G. K.

- 1949 *Human Behaviour and the Principle of Least Action*.

ZISIS, V. G.

- 1954 Cotton, linen and hempen textiles from the fifth century B.C., *Praktika tis Akademeias Athinon* 29, 587.

ZSCHIETZSCHMANN, W.

- 1935 Kykladenpfannen, *Archäologischer Anzeiger* 1935, 652.

Full Captions to the Plates



(See also Notes to the Plates on pages xvii to xviii)

- PL. 1** Marble vessels of the Grotta-Pelos culture.
3, the *kandila*, and 4, the rhyton, are common forms. 1, supposedly from Naxos, ht 7.3 cm; 2, supposedly from Naxos, ht about 17 cm; 3, unknown provenance, ht 23 cm; 4, from Thera, ht 18 cm.
- PL. 2** Marble figurines of the Grotta-Pelos culture.
1, figurines of Louros type, the first 17 cm in height; 2, figurine of Plastiras type, ht 31 cm; 3, Plastiras type, ht 9 cm; 4, schematic figurine (violin form), ht 13 cm; 5, schematic figurine (notch-waisted form), ht 19 cm.
- PL. 3** Pottery of the Grotta-Pelos culture.
1 and 2 from Antiparos, 3–8 from the Pelos cemetery in Melos. Scales in cm.
- PL. 4** Pottery of the Grotta-Pelos culture.
1, ‘frying pan’ of Kampos type, uncertain provenance, diam. 30 cm; 2, bowl with internal rolled rim from Kato Akrotiri, Amorgos, diam. 35 cm; 3–6, sherds of rolled-rim bowls from Cycladic sites; 7, sherd of rolled-rim bowl from the early levels at Phylakopi in Melos, length 16 cm; 8–10, sherds from the early levels at Phylakopi from vessels typical of the Grotta-Pelos cemeteries; 11, fragment of ‘frying pan’ of mainland type from Grotta in Naxos; 12, sherd of ‘frying pan’ of Kampos type from Manika in Euboia; 13 and 14, fragments of ‘frying pans’ of mainland type from Aegina.
- PL. 5** Pottery of the Grotta-Pelos culture from the Cyclades and Crete.
1, pyxis from Paterna in Crete, ht 8 cm; 2, pyxis from Orcheion Kalogrias in Melos, ht 9 cm; 3, bottle of Cycladic provenance, ht 12 cm; 4, bottle from Phylakopi in Melos, ht 8 cm; 5, bottle from Antiparos, scale in cm; 6, bottles from the Pyrgos burial cave in Crete, scale in cm.
- PL. 6** Marble vessels of the Keros-Syros culture from the Cyclades and Crete.
1, from Chalandriani in Syros, ht about 8 cm; 2, of Cycladic provenance, ht 7 cm; 3, from Syros, diam. about 12 cm; 4, from Syros, scale in cm; 5, from Aghios Onouphrios in Crete, diam. about 12 cm; 6, from Aghios Onouphrios in Crete, scale in cm.

PL. 7 Pottery of the Keros-Syros culture.

1, 'frying pan' of Syros type, diam. 17 cm; 2 to 5, painted pottery; 2, ht 9 cm; 3, ht 18 cm; 4, ht 15 cm; 5, ht 8 cm.

PL. 8 Finds of Keros-Syros form from the island of Melos and others.

1, headless folded-arm figurine, ht 21 cm; 2, fragment of folded-arm figurine, ht 6 cm; 3, figurine resembling those of Phylakopi I type, ht 7 cm; 4, schematic figurine of Phylakopi I type, ht 6 cm; 5, schematic figurine of shouldered form, ht 4.1 cm; 6, schematic figurine of Phylakopi I type, preserved ht 5 cm; 7, schematic figurine of Phylakopi I type, preserved ht 4 cm; 8, schematic figurine of Phylakopi I type, preserved ht 5 cm; 9, jar from Phiropotamas, Melos, ht about 10 cm; 10 and 11, jars from the Chalandriani cemetery, Syros, scale in cm; 12 and 13, pots from the Kapro cemetery, Phylakopi, scale in cm; 14, pyxis from the Chalandriani cemetery, Syros, diam. 16 cm.

PL. 9 Pottery of the Kastri and Amorgos groups of the Keros-Syros culture.

1 to 4 from Chalandriani in Syros; 1, ht 12 cm; 2, ht 11 cm; 3, ht about 9 cm; 4, ht 12 cm; 5 and 6, of the Amorgos group, from Antiparos, scale in cm.

PL. 10 Pottery of the Phylakopi I culture.

1, from Phylakopi, ht 27 cm; 2, from Melos, ht 19 cm; 3 to 5, incised pottery from Phylakopi; 6, similar incised pottery from Aegina.

PL. 11 Pottery kernoï from Phylakopi and Crete.

1, from Melos, ht 19 cm; 2, from the Kapro cemetery, Phylakopi, scale in cm; 3, from Koumasa in Crete, ht 15 cm.

PL. 12 Duck vases of the Phylakopi I culture.

1 and 2, from Thera; 3 and 5, from Aegina; 4, from Bozhüyük in western Anatolia; 6, from Amorgos. Heights from 15 cm to 25 cm.

PL. 13 Middle Cycladic pottery.

1, from Grotta in Naxos; 2, from Knossos in Crete; 3, from levels of the Second City at Phylakopi; 4, Middle Minoan Kamares ware from Phylakopi; 5 and 6, Middle Helladic Minyan ware from Phylakopi.

PL. 14 The hilltop and promontory settlements of the third millennium Aegean.

1, the hilltop position of Kastri at Chalandriani in Syros; 2, the promontory of Aghia Irini in Kea.

PL. 15 The storage and processing of food.

1, model granary from Melos, ht 10 cm; 2, wine press at the Vathypetro mansion, Crete (sixteenth century BC).

PL. 16 Honey, wine and fish in the Cyclades.

1, wine service from an Early Cycladic grave in south-east Naxos; 2, pottery bear

with honey pot from Chalandriani in Syros, ht 11 cm; 3, the Fisherman Vase from the Third (late bronze age) City at Phylakopi in Melos, ht of man, 17 cm.

PL. 17 Bronze tools of the third millennium BC. The Kythnos hoard. Scales in cm.

PL. 18 Third millennium metallurgy.

1, five bronze axes from the hoard of Vano 829 at Poliochni in Lemnos, the shortest of length 8 cm; 2, shaft-hole axe from the same hoard, length 16 cm; 3, lead weights of the later bronze age from Phylakopi in Melos, scale in cm; 4, gold pendant of the end of the Early Minoan culture from Chrysolakkos at Mallia in Crete, width 5 cm; 5, gold dress pin from the Poliochni treasure, ht 10 cm.

PL. 19 Metal vessels of the third millennium and their pottery imitations.

1, silver *depos* cup from the Troad; 2, pottery *depos* cup from Troy; 3, gold 'sauceboat' from Arcadia, mainland Greece; 4, pottery 'sauceboat' from Chalandriani in Syros; 5, silver bowl from Kapros in Amorgos; 6, silver bowl from the Cyclades.

PL. 20 Security and redistribution at Lerna.

1, The House of the Tiles, a third millennium 'palace'; 2, fortification wall with semicircular bastions; 3, decorated clay hearth.

PL. 21 Fortifications of stone.

1, wall and bastions of Kastri at Chalandriani in Syros; 2, entrance to the stronghold of Panormos in Naxos; 3, walls of the Second City at Phylakopi in Melos.

PL. 22 Bronze weapons of the third millennium BC.

1 and 2, swords from Amorgos, no. 2 of length 33.2 cm; 3, dagger from Poliochni, in Lemnos, length 17.9 cm; 4 and 5, daggers from the hoard of Vano 829 at Poliochni; 6 and 7, daggers from Amorgos, no. 7 of length 21.4 cm; 8 to 10, spearheads from the Cyclades, no. 9 of length 19.5 cm.

PL. 23 Sealing and seals of the third millennium BC.

1, impressions of the same cylinder seal from (a) Lerna, (b) Tiryns and (c) Zygyouries, ht of impression c. 3 cm; 2, greenstone cylinder seal from Kapros in Amorgos, ht 5 cm; 3, ivory cylinder seal from Poliochni in Lemnos, ht 5 cm; 4, ivory seal from Crete, ht 3 cm.

PL. 24 Vessels of symbolic significance.

1, marble bowl from the Cyclades, originally containing 15 birds, carved from a single block, diam. 41 cm; 2, clay bowl, with shepherd and flock, of Middle Minoan I date, from Palaikastro in Crete, diam. 19 cm.

PL. 25 Built tombs in the Cyclades and Crete.

1, cist grave of the Grotta-Pelos culture at Plastiras in Paros; 2, modern reconstruction at Chalandriani in Syros resembling the graves there of the Keros-Syros culture; 3, the Middle Minoan round tomb at Kamilari in the Mesara plain, Crete.

PL. 26 The obsidian trade etc.

1, stone from south-east Naxos decorated with a spiral arrangement of incised hollows, ht about 60 cm; 2, sherd from Grotta in Naxos incised with a sign of the Minoan Linear A script, length 5 cm; 3, large flake of obsidian used in quarrying the raw material at Dhemenegaki in Melos, length 15 cm; 4, flat-flaked ovates of obsidian from the neolithic settlement at Saliagos near Antiparos; 5, conical obsidian cores from the region of the quarry at Dhemenegaki in Melos; 6, products of the early bronze age blade industry in obsidian: (a) and (b) cores from Phylakopi; (c) and (d) dog-tooth rejuvenation flakes from Phylakopi; (e) blade from Herakleia.

PL. 27 Music and revelry.

1, marble musician (Keros-Syros culture) from Keros, ht 20 cm; 2, marble musician (Keros-Syros culture) from Thera, ht 17 cm; 3, the Harvester Vase: steatite vase of Late Minoan I date from Aghia Triadha in Crete, showing workers singing as they return from the olive harvest, diam 11 cm.

PL. 28 Third millennium shipping.

1, incised sherd from Phylakopi in Melos, showing the stern of a ship, with steering oar, length 9 cm; 2, painted sherd, from the First or Second City at Phylakopi, showing masted longship, with oars and steering oar, length 10 cm; 3 and 4, lead models of Early Cycladic long ships from Naxos, no. 3 (incomplete), preserved length 39 cm, no. 4, length 40.3 cm; 5, baked clay model of boat, possibly a dug-out, from Mochlos in Crete, length 20 cm; 6, baked clay model of long boat from Palaikastro in Crete, length 20 cm.

PL. 29 'Unending rapport' – spiral decoration in the early and late bronze age.

1, decoration of 'frying pan' from Chalandriani in Syros (Keros-Syros culture), diam. 21 cm; 2, decorated slab of the ceiling of the 'Treasure of Minyas', the late bronze age tholos tomb at Orchomenos.

PL. 30 Two varieties of the folded-arm figurine of the Keros-Syros culture.

1, 2 and 5, the Dokathismata variety; 3, 4 and 6, the Koumasa variety. 1 and 2 from Grave 14 at Dokathismata in Amorgos, ht 20 and 16 cm; 3 and 4 from Teke in Crete, ht 13 and 15 cm; 5 reputedly from Amorgos, ht 35 cm; 6 from Siteia in Crete, ht 10 cm.

PL. 31 Large sculptures of the Keros-Syros culture.

1, from the Cyclades, ht 71 cm; 2, from the Cyclades, ht 65 cm.

PL. 32 Representation and abstraction: marble heads of the Keros-Syros culture.

1, with decoration in red paint, reputedly from Amorgos, ht 25 cm; 2, with facial features in low relief, from the Cyclades, ht from elbows 17 cm; 3, from Amorgos, ht 35 cm; 4, from Amorgos, ht 92 cm.

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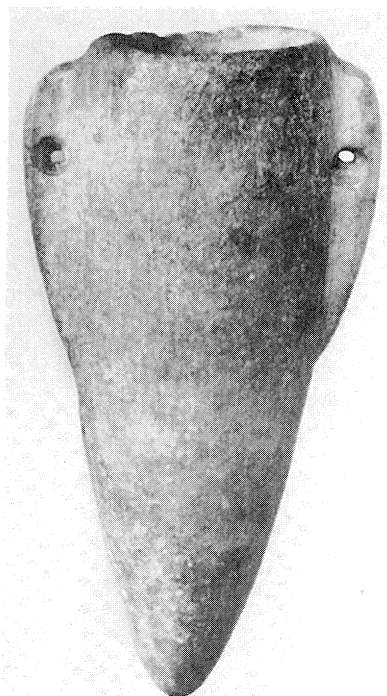
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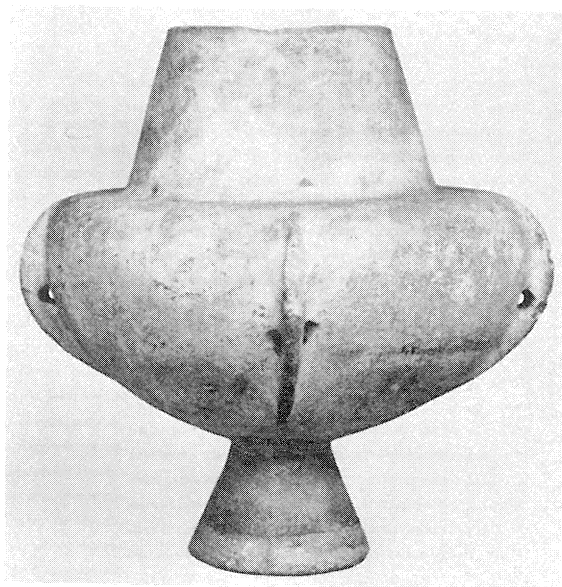
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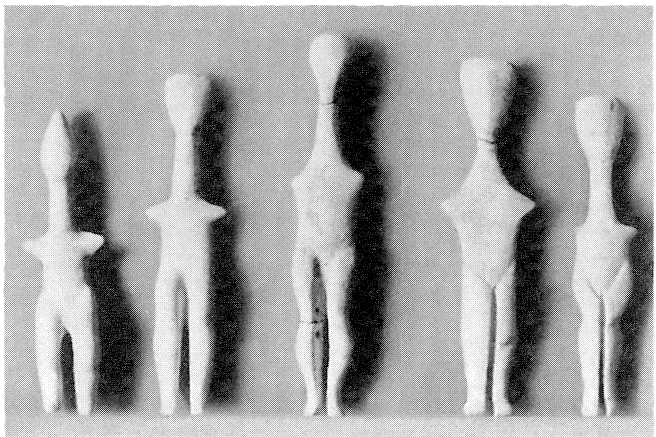


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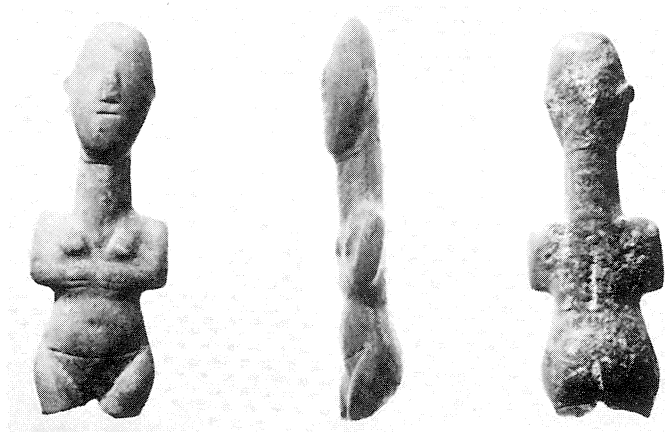
PL. 1 Marble vessels of the Grotta-Pelos culture



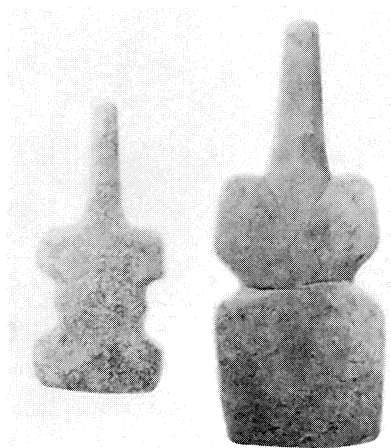
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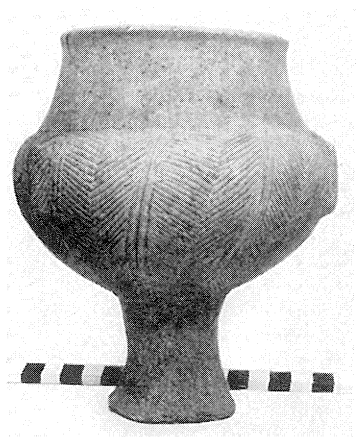


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PL. 2 Marble figurines of the Grotta-Pelos culture



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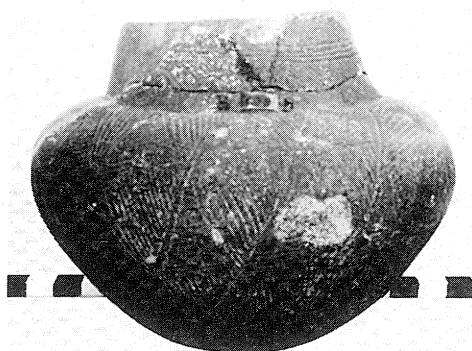
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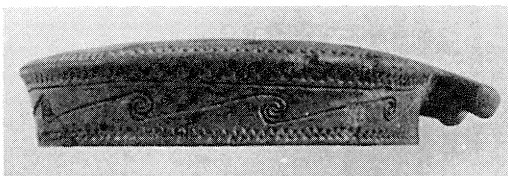


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PL. 3 Pottery of the Grotta-Pelos culture



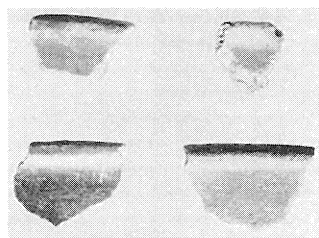
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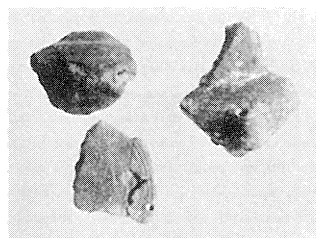
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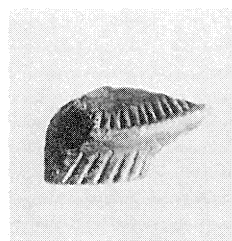
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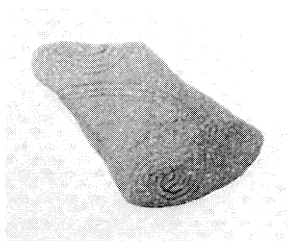
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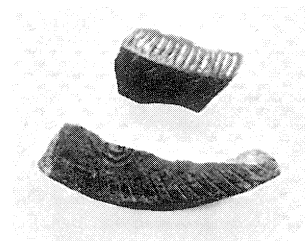
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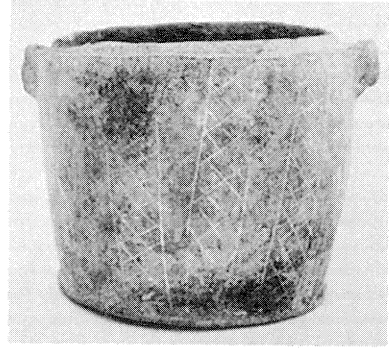
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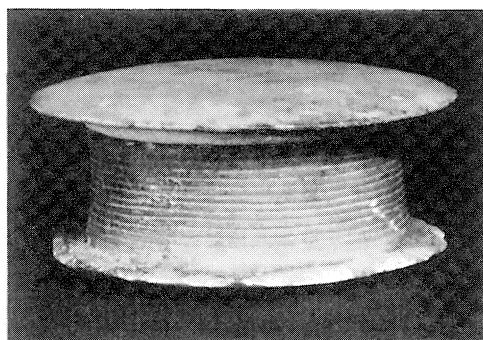
PL. 5 Grotta-Pelos culture pottery from the Cyclades and Crete



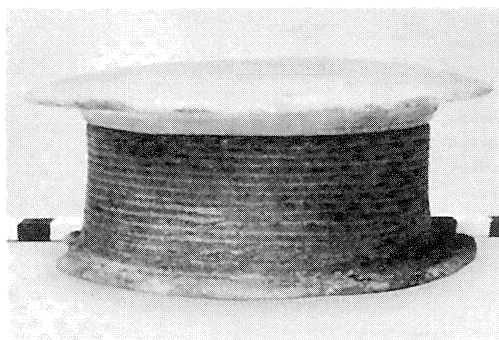
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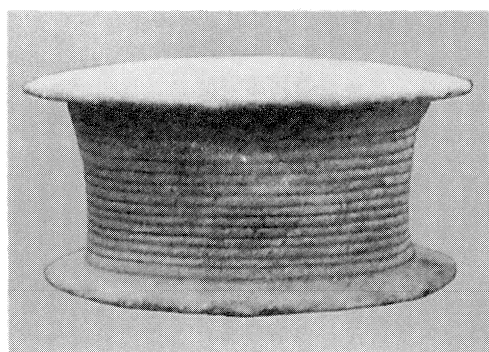
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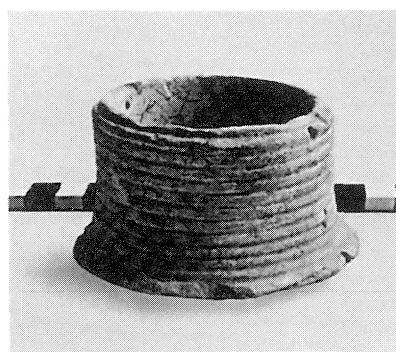
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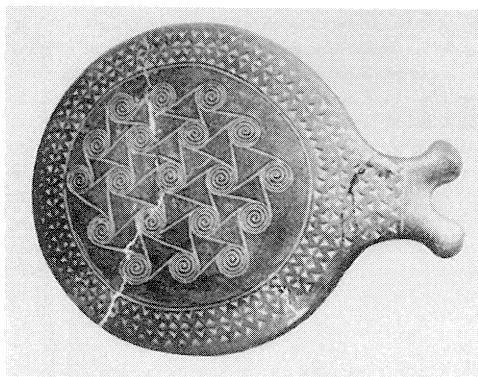


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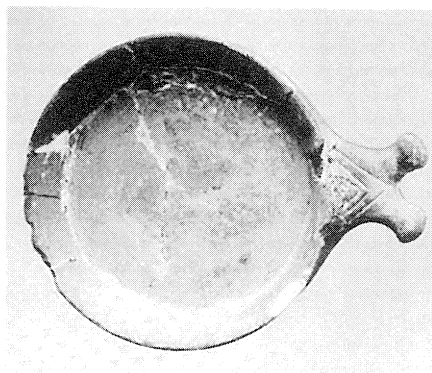


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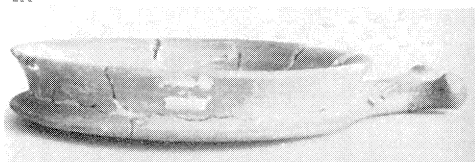
PL. 6 Keros-Syros culture marble vessels from the Cyclades and Crete



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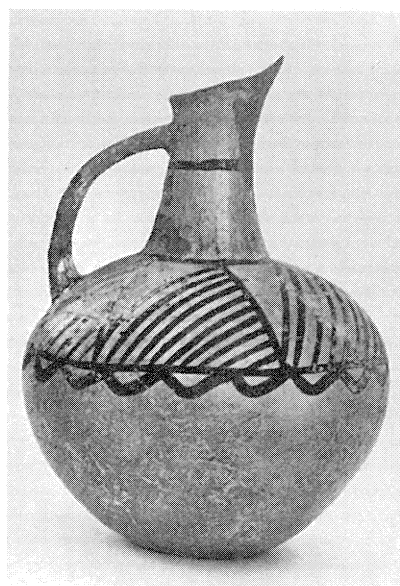
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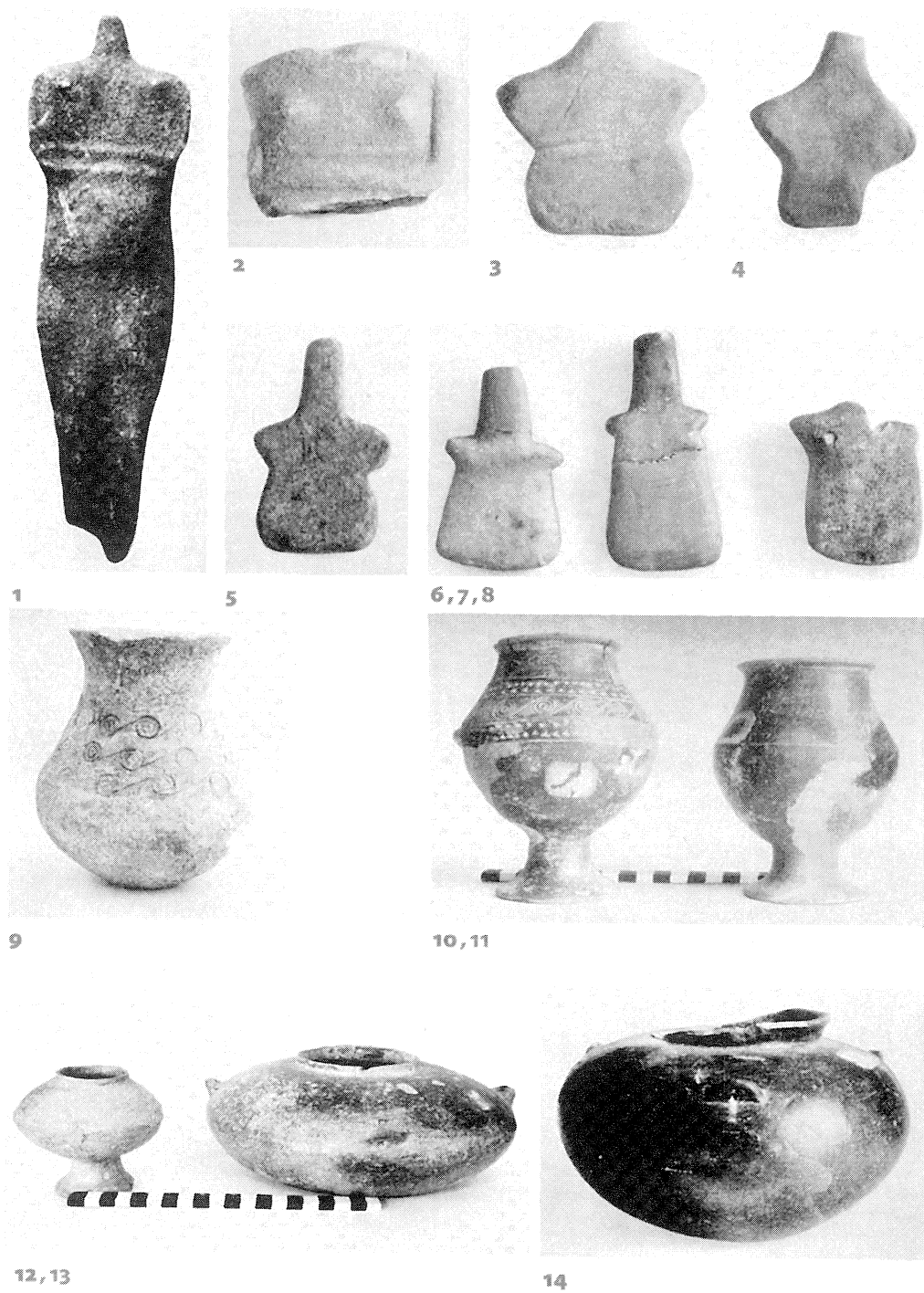
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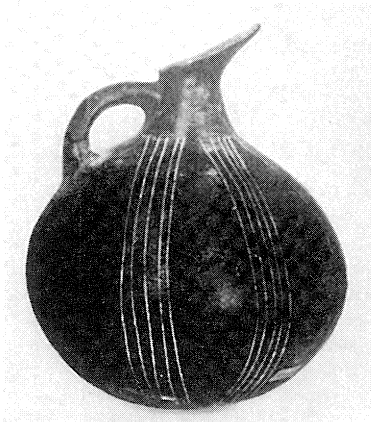
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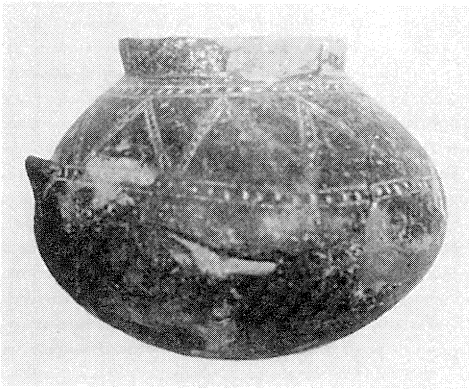
PL. B Finds of Keros-Syros form from Melos and others



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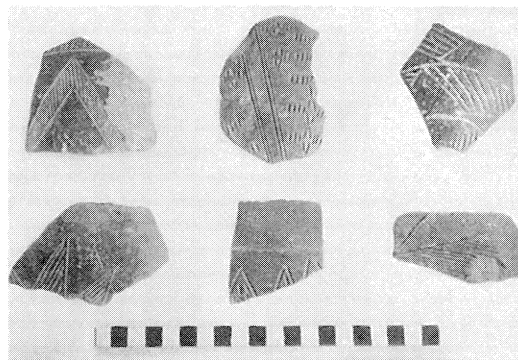
PL. 9 Pottery of the Keros-Syros culture – Kastri and Amorgos groups



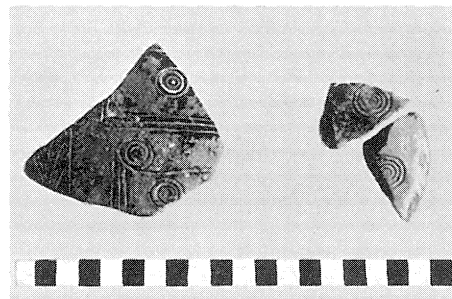
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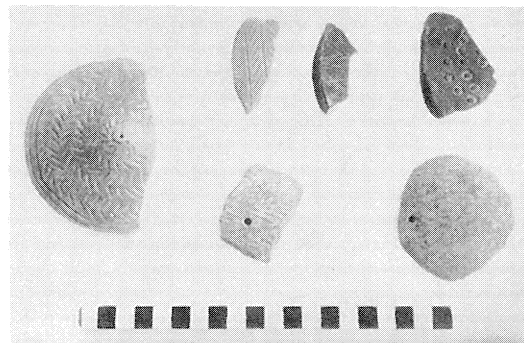
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PL. 10 Pottery of the Phylakopi I culture



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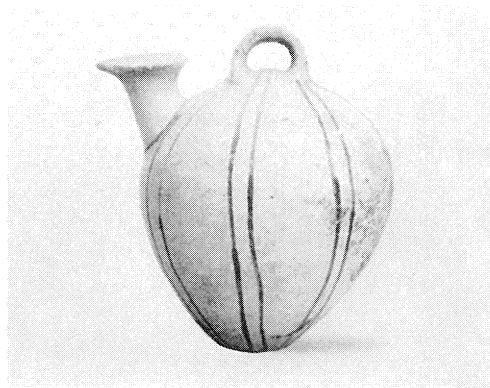


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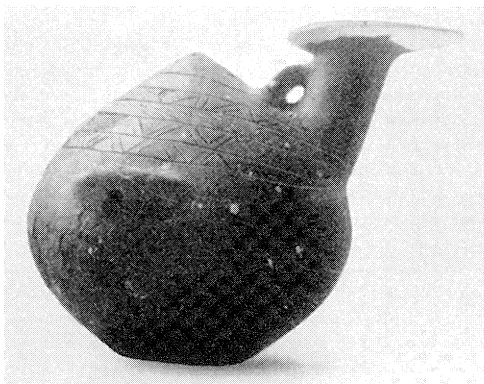
PL. 11 Pottery kernoi from Phylakopi and Crete



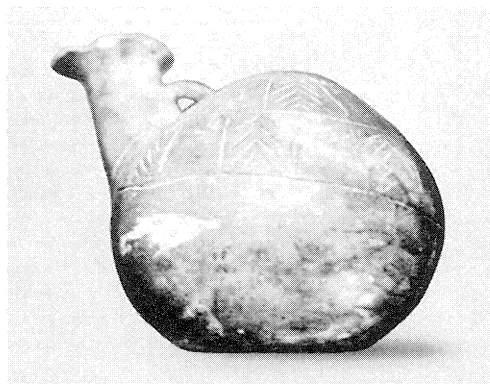
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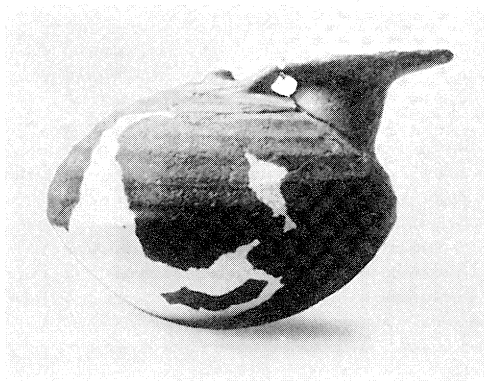
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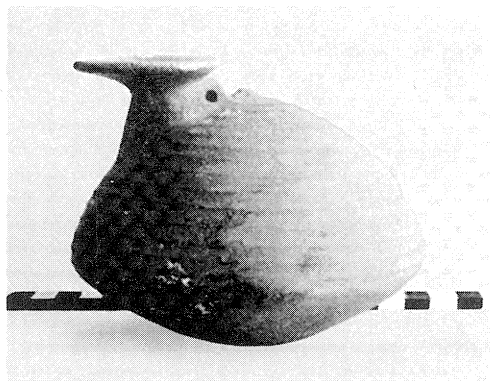
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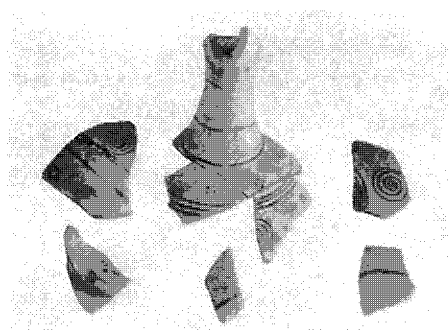


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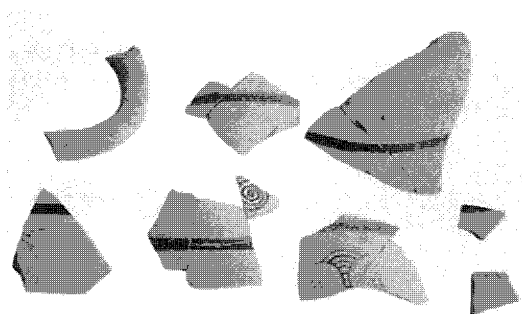


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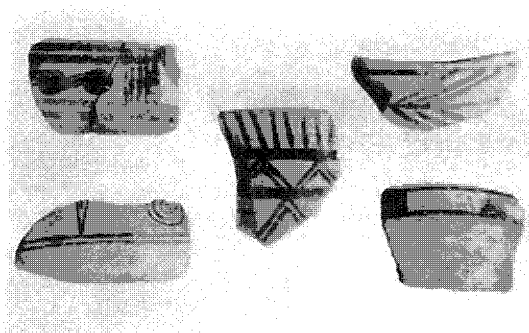
PL. 12 Duck vases of the Phylakopi I culture



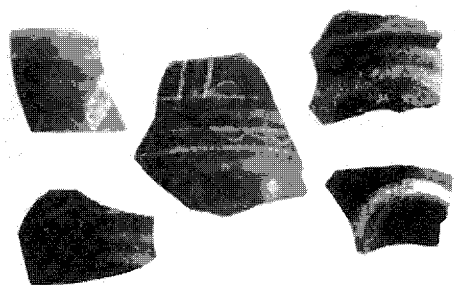
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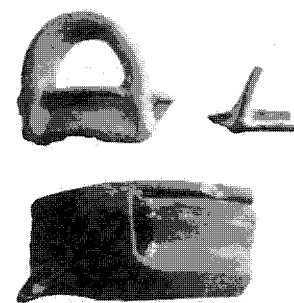
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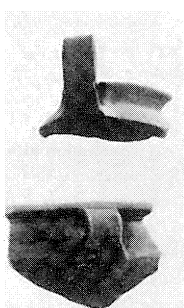
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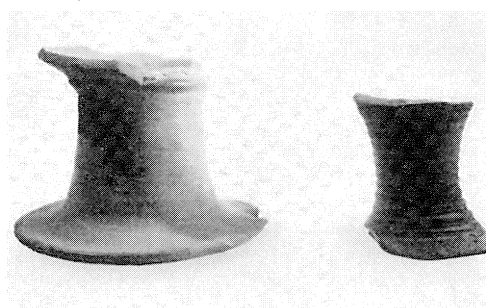
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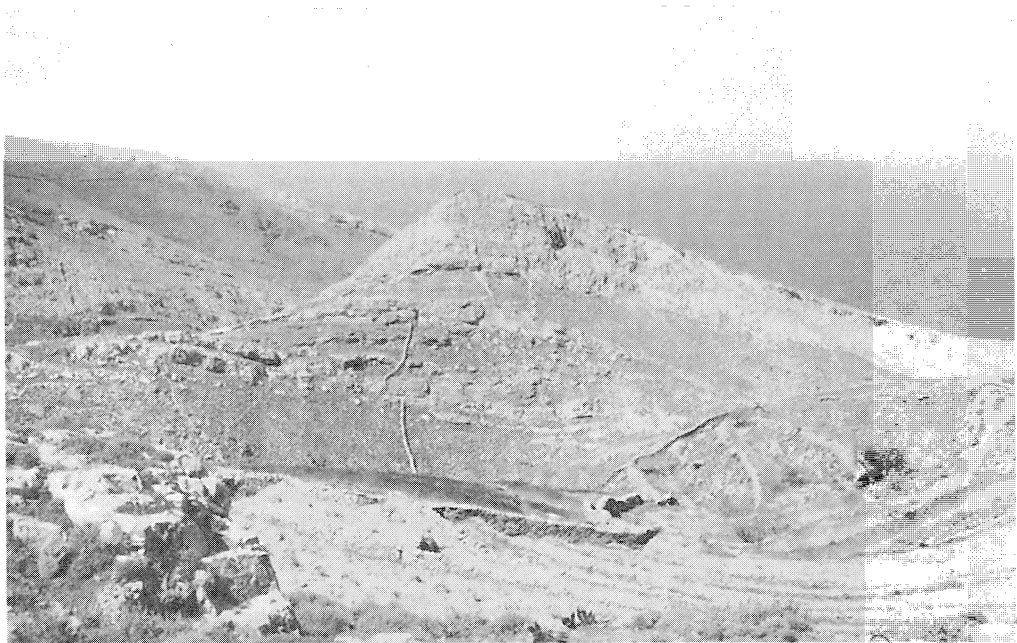
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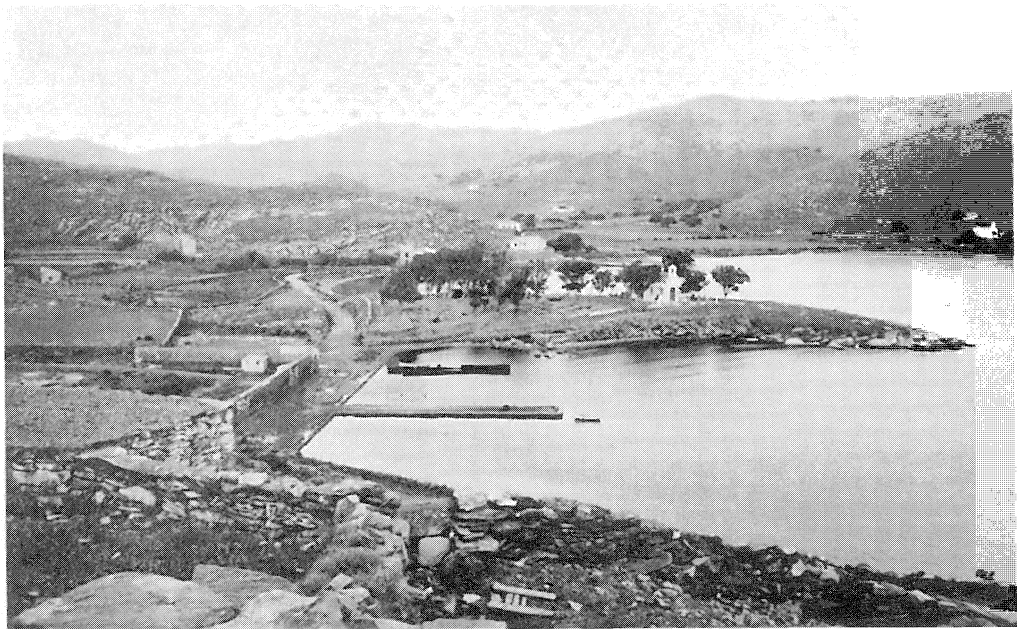
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PL. 13 Middle Cycladic pottery

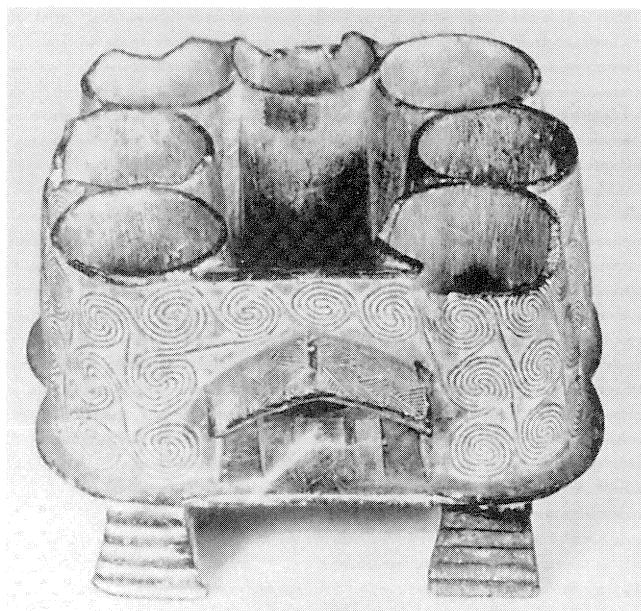


1



2

Pl. 14 Hilltop and promontory settlements of the third millennium

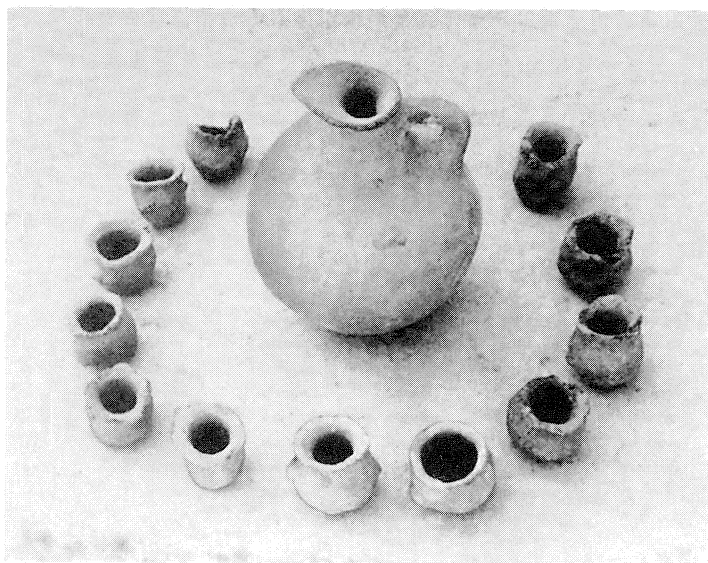


1



2

PL. 15 The storage and processing of food: granary and press



1

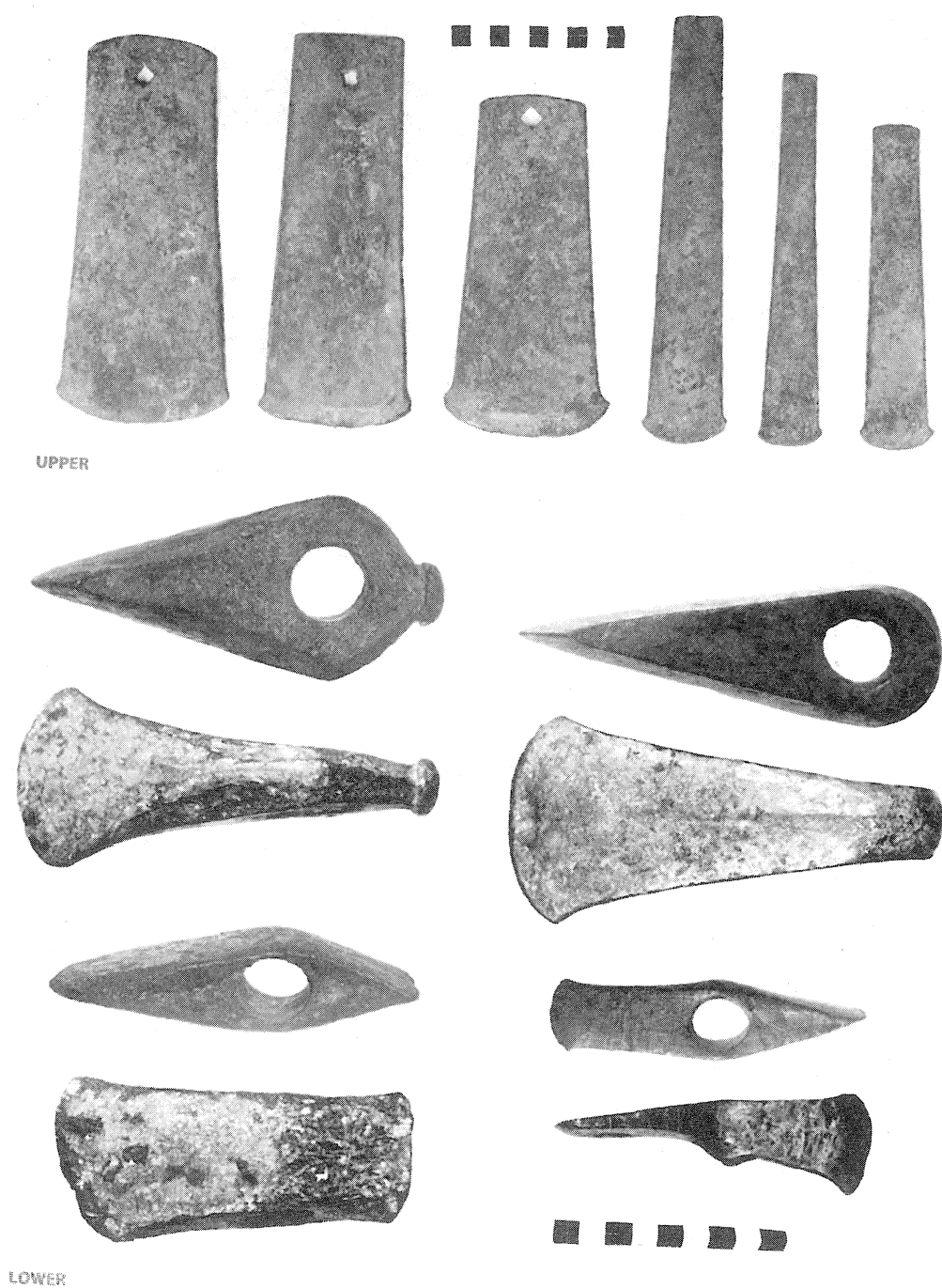


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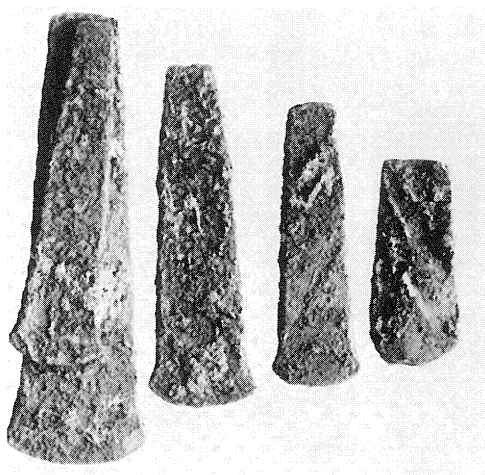


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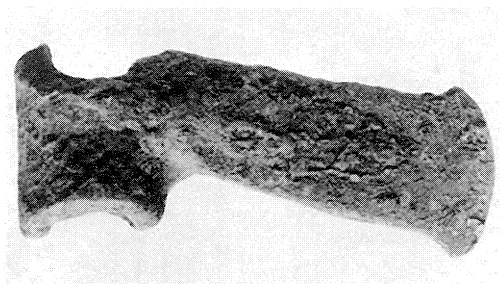
PL. 16 Honey, wine and fish in the Cyclades



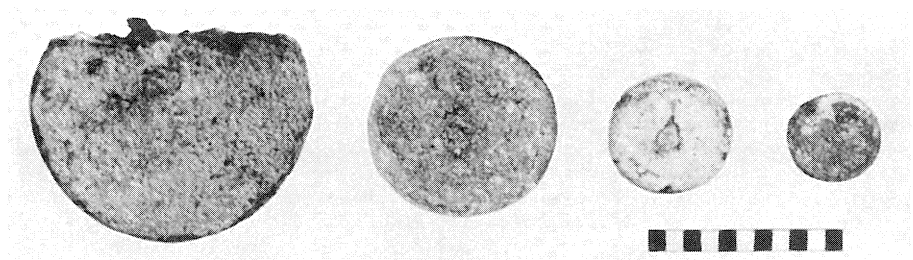
PL. 17 Bronze tools of the third millennium BC: the Kythnos hoard



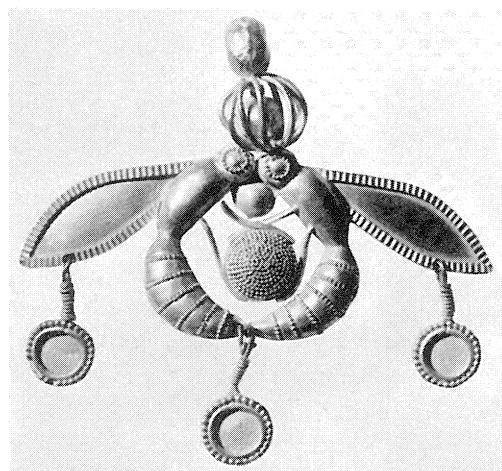
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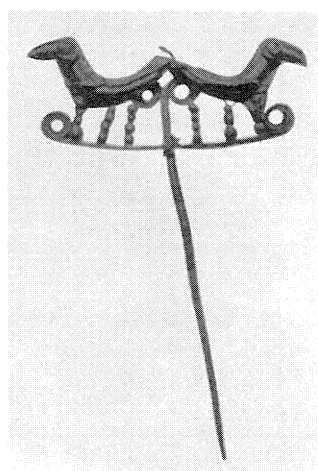
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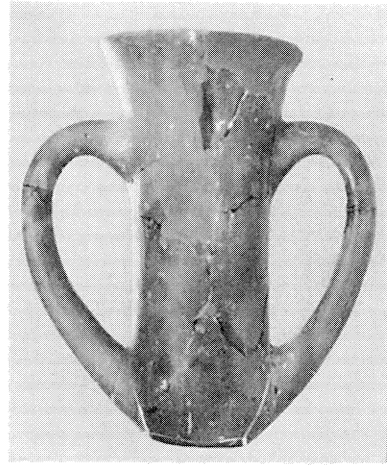


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PL. 18 Third millennium metallurgy



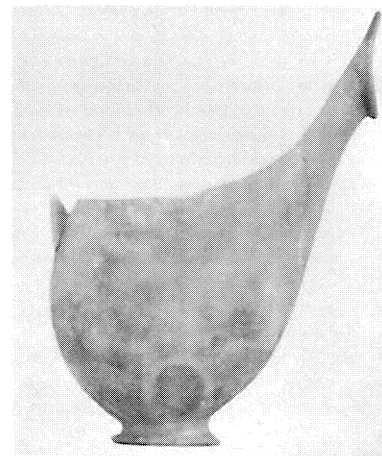
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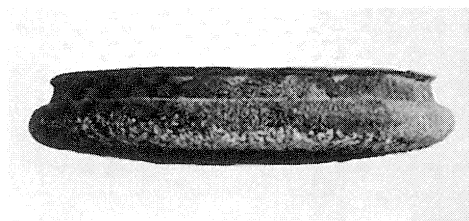
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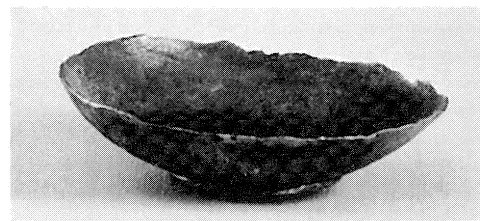
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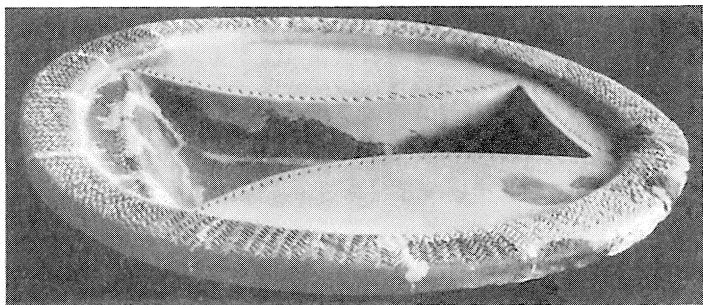
PL. 19 Third millennium metal vessels and their pottery imitations



1



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PL. 20 Security and redistribution at Lerna



1



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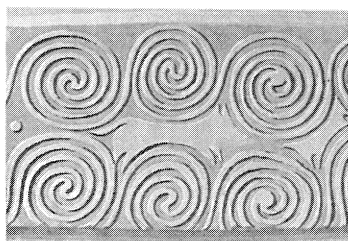


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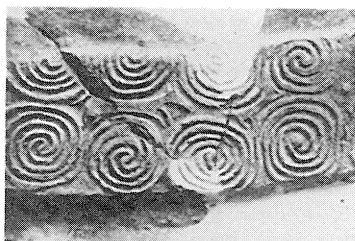
PL. 21 Fortifications of stone



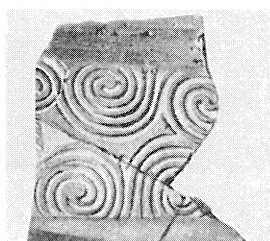
PL. 22 Bronze weapons of the third millennium BC



1A



1B



1C



2



3A



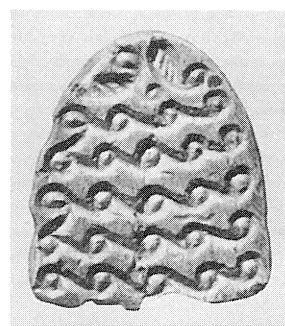
3B



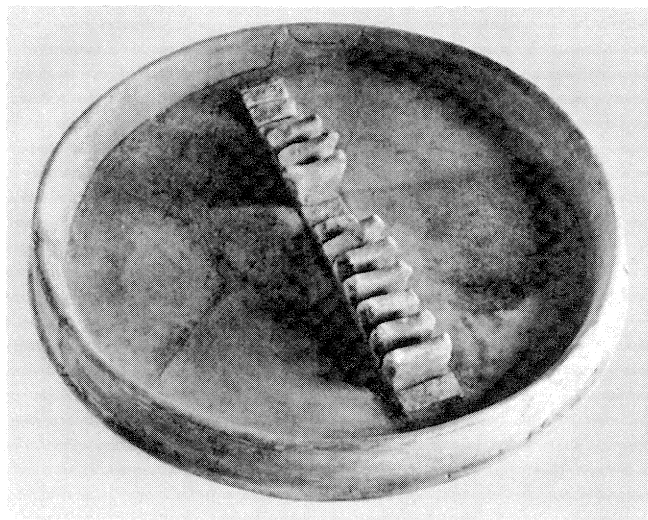
4A



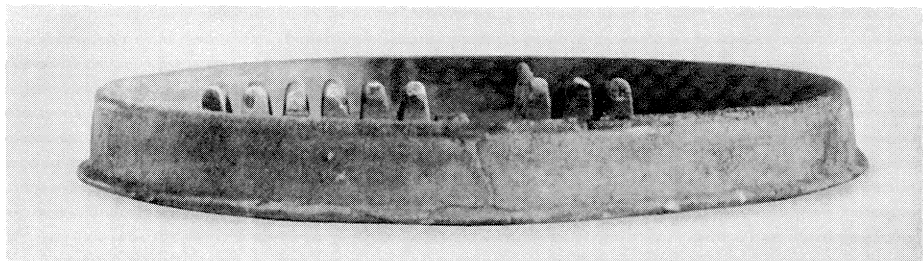
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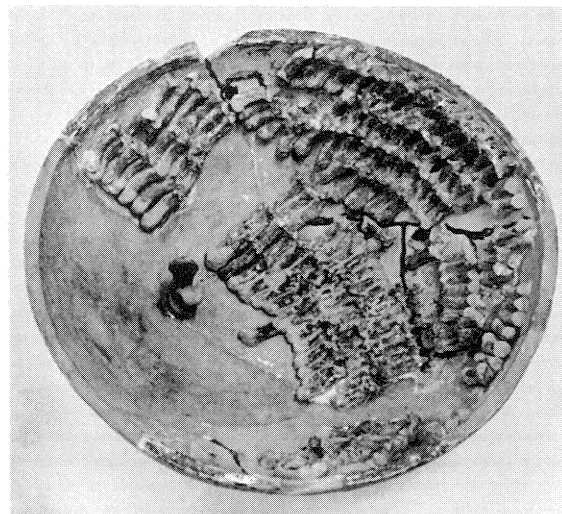
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1A



1B



2

PL. 24 Vessels of symbolic significance



1

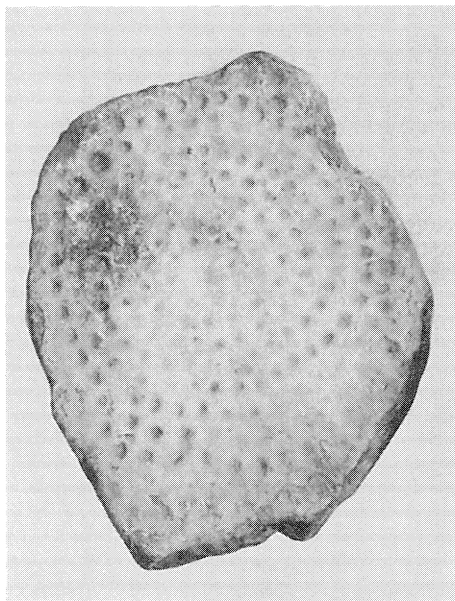


2



3

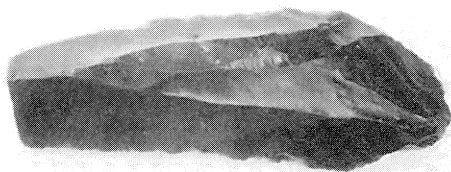
PL. 25 Built tombs of the Cyclades and Crete



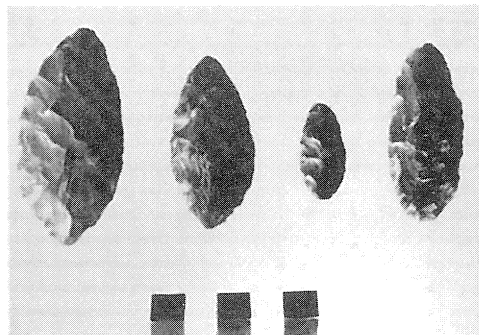
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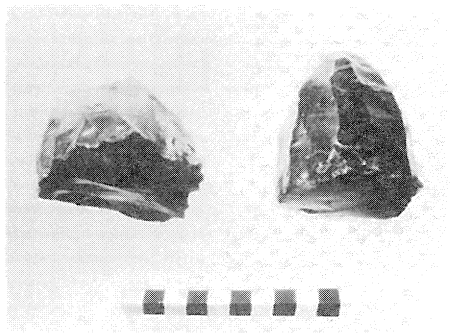
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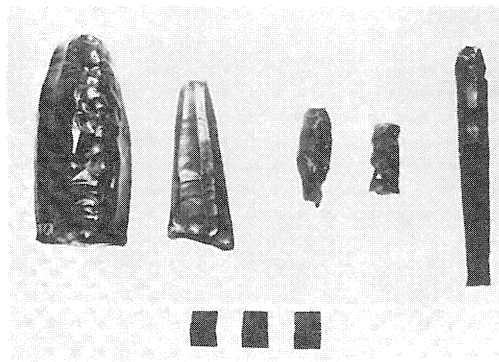
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PL. 26 The obsidian trade etc.



1

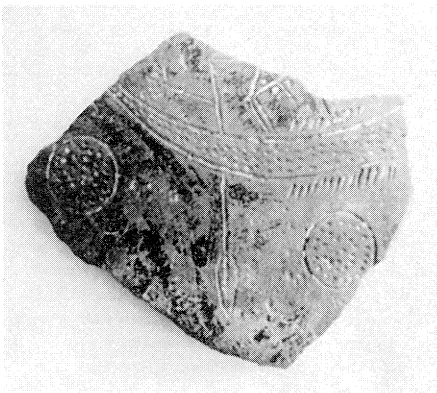


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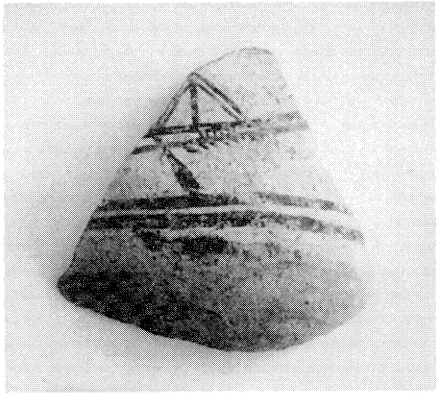


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PL. 27 Music and revelry in the bronze age



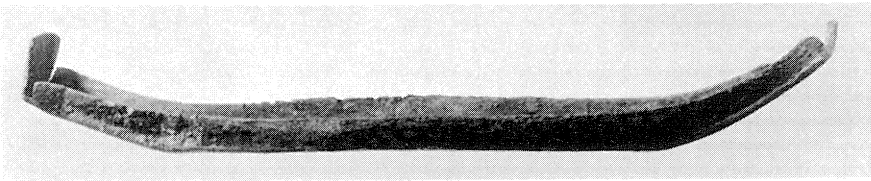
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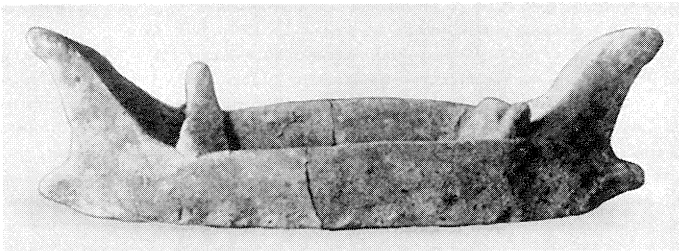
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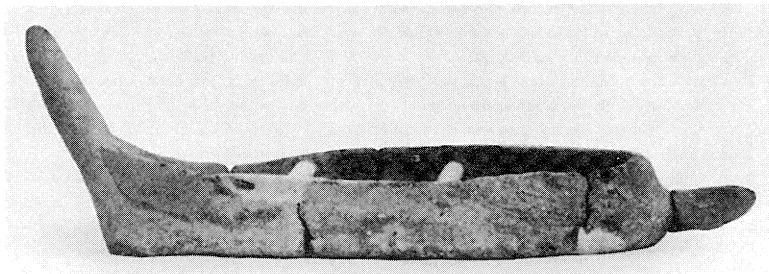
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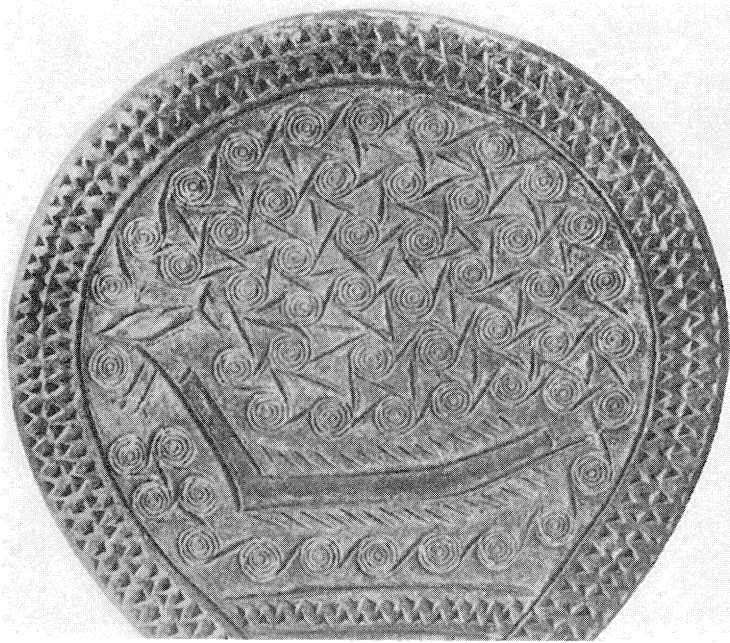


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PL. 28 Third millennium shipping

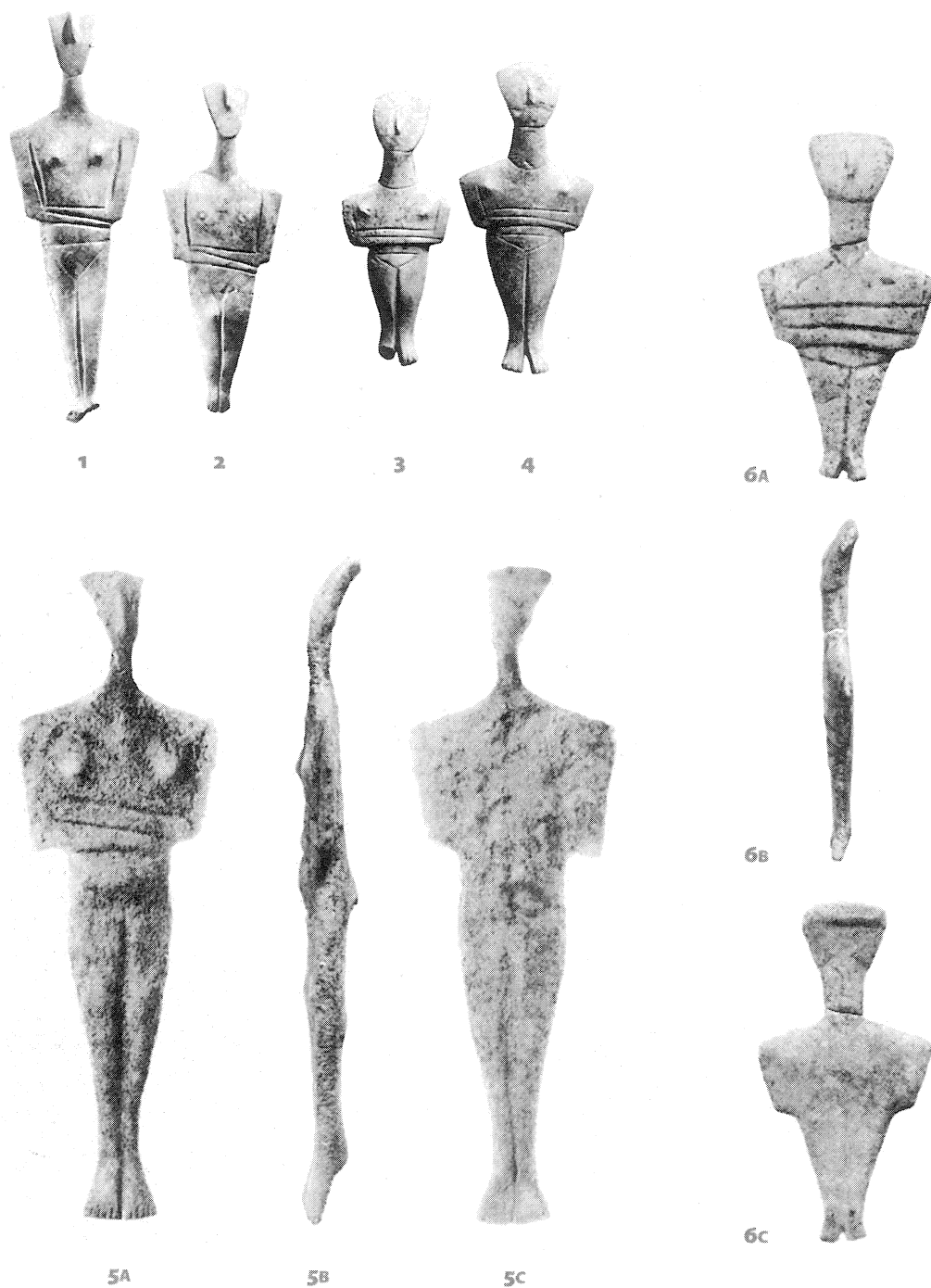


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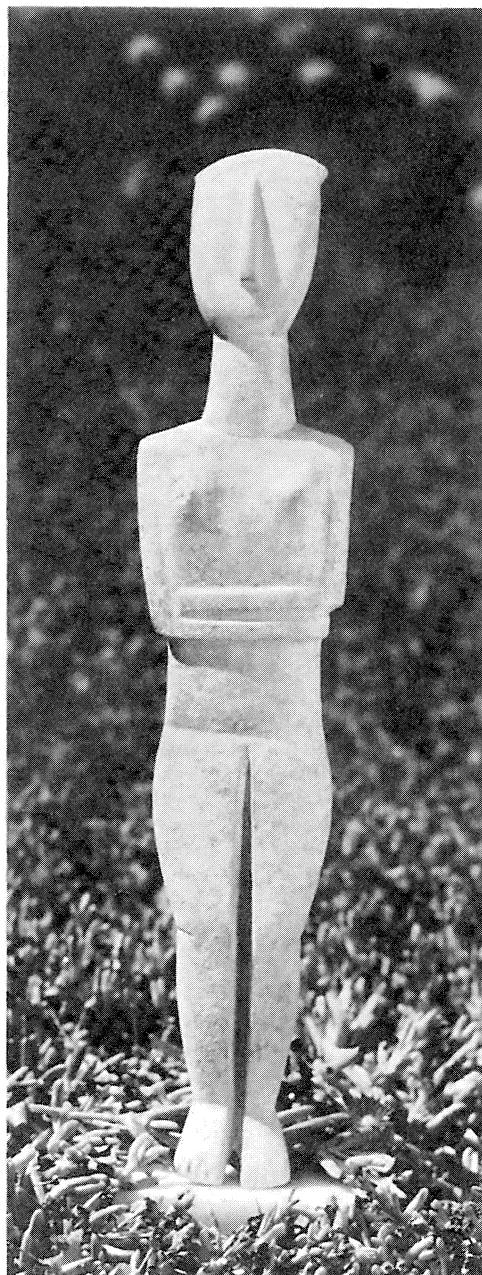
PL. 29 *Unending rapport* — early and late bronze age spiral decoration



PL. 30 Two varieties of the Keros-Syros culture folded-arm figurine

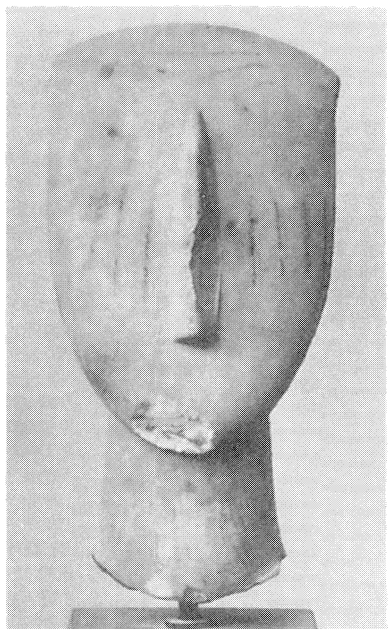


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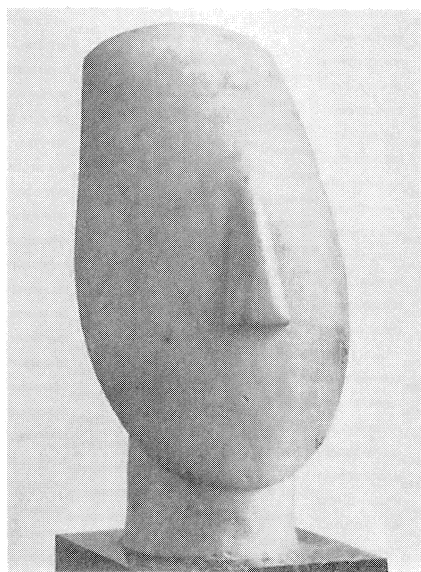
PL. 31 Large sculptures of the Keros-Syros culture



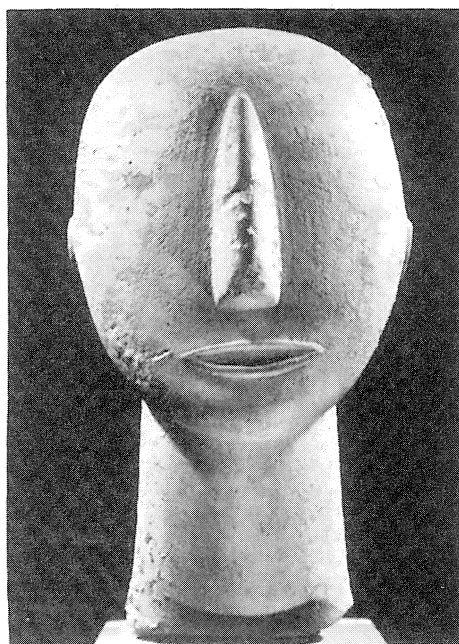
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PL. 32 Representation and abstraction — marble heads of the Keros-Syros culture